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# *The* JOURNAL OF RADIOLOGY

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### The Selective Action of Dyes Used in Medicine: A Historical Sketch\*

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Editor Journal American Association for Medico-Physical Research.

THE scientific use of dyes in medicine dates from Ehrlich<sup>1</sup>. Nearly forty years ago he used dyes to stain bacteria, and to differentiate the different classes of white blood corpuscles. He believed that the dye which stained a germ was a sterilizer of that germ. He introduced methylene blue as a remedy for malarial fever and trypan red for bovine prioplasmosis. He found that one of the acridine dyes possessed notable therapeutic effects in trypanosome infections and for this reason gave it the name of trypanflavine.

Most of the early observers of the selective action of dyes on bacteria were Europeans. Among these should be mentioned Penzoldt, Spina and Stilling of Germany; Bourdillon, Cornil, Egasse and Fano of France; Bergonzini and Mya of Italy, and Blomberg of Sweden. Most of these men conducted researches or reported results on the use of methylene blue as a remedy in the treatment of malaria or neuralgia. Stilling conducted extensive researches on the antiseptic action of methyl violet. He recommended this in the treatment of eye troubles such as blepharitis, conjunctivitis and corneal ulcer.

The real impetus to a general use of dyes in medicine is due to the laboratory studies of an American, Dr. John W. Churchman (formerly of Johns Hopkins University, more recently of Cornell University), who has spent years in the study of gentian violet and of Browning and other English investigators of the bacteriostatic action of the acridine dyes, especially acriflavine and proflavine.

#### SELECTIVE ACTION OF GENTIAN VIOLET

In 1912, Churchman called attention to the selective action of gentian violet on bacteria. He conducted an extensive series of experiments on cultures and on animals<sup>2</sup>. He found that certain bacteria when stained with gentian violet were inhibited in their growth, that the same bacteria when planted on media stained with gentian violet did not proliferate, that gentian violet was, in fact, more effective in its inhibitory action on bacterial growth when it was incorporated in the medium than when it was applied direct to the bacterial bodies. He also found that other bacteria were in no way affected by gentian violet when the dye was used to stain either the bacteria or the medium on which they were planted.

These conclusions were reached by laboratory experiments, agar-agar and broth being used for culture media. Several scores of species and nearly 400 strains of bacteria were used. In nearly every case, the violet-positive bacteria refused to grow not only in medium stained with gentian violet, but in its immediate neighborhood. For some experiments, he used agar-agar in petrie dishes, one-half of the surface being covered with unstained agar-agar, the other half with agar-agar stained with gentian violet. Colonies 8 to 10 millimeters from the gentian violet side of the petrie dish were often deeply stained though the intervening agar-agar showed no sign of the dye to the naked eye. With very few exceptions the bacteria whose growth was inhibited by gentian violet were gram-positive while those not inhibited in their growth by gentian violet were gram-negative.

\*Read at the Third Annual Meeting of the American College of Radiology and Physiotherapy, Chicago, Nov. 14, 1924.

These experiments seemed to demonstrate conclusively the bacteriostatic action of gentian violet, that is, its power to suspend reproduction for violet positive organisms, whether applied directly to them or incorporated in the medium in which they were planted.

#### BACTERICIDAL POWER OF GENTIAN VIOLET

Churchman next sought to determine whether gentian violet had bactericidal power. Experiments were, therefore, conducted on guinea pigs. They were inoculated with a strain of blastomyces stained with gentian violet. For the control animal, unstained bacteria were used. The control animal was dead in twenty days and the injected organism was isolated from the heart's blood. The animals receiving an inoculation of the stained organisms were alive and well four months after inoculation.

A similar experiment was performed on rabbits with micrococcus aureus. The control rabbit was dead in twenty-four hours, while those inoculated with the stained organisms, with one exception, were alive and well after three months. These experiments seemed to prove that gentian violet had bactericidal power, and that the dye was efficient even when enormous doses of the stained staphylococci were given. These experiments further demonstrated that spores cannot develop from gram-positive bacteria under the influence of gentian violet.

#### CLINICAL USE OF GENTIAN VIOLET.

In 1918, in 1920, and again in 1921, the Journal of the American Medical Association<sup>3</sup> published articles by Churchman in which he gave a number of case reports of acute purulent infected joints which were treated by gentian violet with success. He concluded that pyogenic arthritis, due to the staphylococcus aureus or to the pneumococcus may be cured of the infection by lavage and staining with gentian violet and, furthermore, that normal mobility may thus be retained.

Further experiments on animals showed that the stain of gentian violet actually penetrated the living tissue cell and the living nucleus of the epithelium of the bladder without doing any appreciable damage to the cells. Gentian violet injected into the circulation of a rabbit soon disappeared from the blood stream. Likewise it ultimately disappeared from the stained tissue cells.

The fact that other dyes of the triphenyl-methane group<sup>4</sup>, notably rosalin and malachite green, have the same bacteriostatic action on gram-positive bacteria as gentian violet suggested that the selective action of these dyes was due to a particular portion of the chemical molecule of this group<sup>5</sup>. Churchman has noted that gentian violet possesses radiant energy. A fairly good picture of a silver coin in one instance was secured when a photographic plate was subjected to the influence of gentian violet.

#### GENERAL DEDUCTIONS.

The general deductions which may be drawn from the reports of Churchman as to the selective action of gentian violet are as follows:

1. The action of gentian violet is bacteriostatic rather than bactericidal for gram-positive bacteria. It has little or no selective action against the proliferation of gram-negative bacteria.
2. The action of gentian violet when used therapeutically is enhanced if the solution used is hot.
3. The resistant action of gram-negative bacteria to the influence of gentian violet seems to depend on a community action, the resistance being much diminished when only a few bacteria are present<sup>6</sup>.
4. Gentian violet is an effective bactericide in the treatment of infected joints, empyema, or sinus infection and in the treatment of wounds infected with the bacillus diphtheriae.
5. A dilution of 1:1,000,000 of gentian violet is sufficient to inhibit or entirely suppress fission of many gram-positive bacteria. These bacteria never grow on media stained with a dilution of 1:100,000.
6. The bacillus coli is highly resistant to gentian violet.
7. The selective action of dyes cannot be explained by the phenomenon of permeability. Both gentian violet and acid fuchsin stain gram-positive organisms, yet only the former is bactericidal for these organisms. Nor does selective action seem to depend on the color quality of a dye, for it has been proven that the selective action of carbol fuchsin for gram-negative organisms is due to a colorless atom of the ethyl sulphonic group which enters into the make-up of the molecule of this dye. The explanation of the selective actions of dyes may be one of electrical absorption, since basic dyes which are electro-positive behave

differently from acid dyes which are electro-negative<sup>6</sup>.

#### CONTRIBUTIONS OF OTHER INVESTIGATORS.

Other investigators and clinicians have corroborated the findings of Churchman, and have added much evidence as to the therapeutic use of gentian violet as a bacteriostat in the treatment of infections due to gram-positive bacteria.

Davis<sup>7</sup> and Majors<sup>8</sup> have proved it to be effective in the treatment of empyema when injected into the pleural cavity. No rib resection is necessary.

#### EFFECTIVE IN EMPYEMA.

Davis reports 18 cases of empyema, 15 of them in the early seropurulent or purulent stages and three cases in the encapsulated stage—all cured by the use of gentian violet. He used a 50 c.c. Luer syringe with a short rubber tube between the needle and the syringe to aspirate the exudate and to introduce the gentian violet. The first treatment consisted of injecting one-half as much gentian violet, 1 : 2,500, as exudate was withdrawn. From one to five days later the treatment was repeated, a solution of 1 : 1,000 being used. A third and fourth treatment was given when necessary.

In 1921, Mooser and Monroe<sup>9</sup>, of the American Hospital in the city of Mexico, conducted a series of experiments to determine the toxic effects of gentian violet. Rabbits were used in the experiments and the dye was administered intravenously. Noting no toxic effects, gentian violet was used intravenously in the treatment of several desperate cases of sepsis with marvelous results in nearly every instance. The cases included were those of puerperal sepsis, wound infection, cholecystitis and otitis media. The cases successfully treated were those of sepsis due to staphylococcus or streptococcus infection. The dye failed to affect cases due to colon infection. Mooser recommends that cases complicated by foci of infection, have the foci drained and injected with gentian violet.

Young and Hill<sup>10</sup> of Johns Hopkins have also reported a number of cases of sepsis due to staphylococcus infection which were saved from death by the intravenous use of gentian violet.

The writer has successfully used gentian violet intravenously in the treatment of one

case of staphylococcus infection of the kidney and bladder.\*

The writer uses gentian violet in the treatment of furuncles and other foci of staphylococcus infection easily accessible. A foci of infection is injected with gentian violet, 1 : 1,000, and the skin area about the focus painted with a saturated solution of gentian violet. Gentian violet is also used in the treatment of sinus infection, mucous colitis and some forms of leucorrhea. In September, 1923, the writer, in a discussion of a paper on *Ultra Violet Rays in Diphtheria Carriers*, suggested that gentian violet might prove a valuable aid in the treatment of diphtheria<sup>11</sup>.

Saurman<sup>12</sup> has used a spray of gentian violet to clean up the throats of diphtheria carriers.

#### DOSAGE.

Gentian violet may be used as an irrigation fluid or for wound dressing in strengths of 1 : 100,000 up to 1 : 1,000. It may be administered

#### THE WRITER'S EXPERIENCE.

\*Case Report: Patient, Miss G., aged 41, was referred to me with a history of weeks of suffering from pain in bladder, much aggravated by micturition or defecation. The urine was scant and loaded with pus. Her physician had referred her to a surgeon, who after cystoscopic examination and a culture from the urine diagnosed the case as tuberculosis of the left kidney and recommended immediate nephrectomy. This advice the patient was unwilling to follow and, upon the recommendation of her physician, consulted me to learn if physiotherapy had anything to offer in such a case.

She was very much emaciated, weighed 87 pounds, was very weak, spent most of the time in bed, and her hips were so thin that she had to sit on a rubber cushion. She had no appetite, was nauseated. The bladder was contracted and very sensitive, would not hold over three ounces of irrigating fluid. She was running a daily temperature a little above 100°.

The case did not look promising. Another surgeon was consulted. The latter advised phototherapy rather than surgery. I undertook to direct the light treatments. These were given daily. The patient was placed on a high vitality liquid diet (fruit juices, soup from green vegetables and bran leach) until the appetite returned and she could eat fruit and green vegetables both raw and cooked. Calcium hydrosol was administered orally and intravenously. The patient improved very slowly for several weeks, when another culture was made from the urine. The growth of staphylococcus was so luxurious that the intravenous injection of gentian violet was decided upon. No tubercle bacilli were found in the culture. An injection of 1½ grains of gentian violet was given. A culture made three days later showed a marked reduction in the number of staphylococci.

During the next seven weeks six intravenous injections of gentian violet were given of 1½ to 4 grains each, at intervals of five days to two weeks. The urine was cleared up and was normal in quantity. The bladder irritation and pain ceased. The appetite returned and food was eaten with relish. The rubber cushion was soon discarded. It is now over a month since the last culture was made and the last injection of gentian violet was given. The patient has gained 17 pounds in weight, feels well, looks well and has returned to her work. The temperature varies but slightly from normal. Repeated cultures failed to show the tubercle bacillus, though each examination showed some staphylococci.

orally in tablets of  $\frac{1}{2}$  grain to 2 grains. It may be used intravenously in small repeated doses of  $\frac{1}{2}$  grain to 2 grains, or it may be administered as one massive dose. The experiments of Young and Hill<sup>10</sup> show there are no ill effects following a dose of five milligrams to a kilogram of body weight. This quantity is estimated to produce in the blood stream a dilution of 1 : 100,000. When a massive dose is given, it is seldom necessary to repeat the dose. Mooser secured equally good results with a smaller dose repeated several times.

To prepare the dye for intravenous use, it is dissolved in distilled water, filtered and sterilized in a water bath for ten minutes. For children a one-half per cent solution is used, for adults a one per cent solution.

#### INDICATIONS FOR GENTIAN VIOLET.

Gentian violet is to be thought of in cases of either general septicemia or localized infection when the offending organism is due to the staphylococcus, the streptococcus, the pneumococcus, the bacillus diphtheria, the tetanus bacillus or the bacillus anthracis. It is to be thought of in the treatment of puerperal sepsis, empyema, diphtheria, sepsis from wounds, osteomyelitis, cholecystitis, and mucous colitis. Bassler<sup>11</sup> reports success in the treatment of 36 cases of mucous colitis with either gentian violet or acriflavine<sup>12</sup>. He employs these dyes for oral administration in enteric coated pills to be taken after meals and uses the indicated dye for duodenal lavage and enemata. He finds that with his method of treatment surgical operations seem no longer necessary—rarely to be performed. If in doubt about the nature of the infection with which you have to deal, cultures should be made from the blood, urine, exudate, or discharge. Gentian violet may prove a life saver.

#### ACRIFLAVINE.

The investigations of Churchman, Brown<sup>14</sup> and others<sup>15</sup> have shown that we have in acriflavine<sup>16</sup> a dye which is selective for gram-negative bacteria, especially the gonococcus and the colon bacillus. This dye was used in France under the name "gonocrine." It is bacteriostatic and is to be associated with infections due to the bacillus coli, the bacillus dysentericus, the bacillus pyogenes, the bacillus typhosus, and the gonococcus, in short with the infections of the genital and the intestinal tracts. Its penetrating powers are very great.

Experimental studies show that, when used as an urethral injection even the muscular layers are deeply stained. In the treatment of gonorrhea in males, the accepted technique is daily irrigations with a warm physiological saline solution of acriflavine 1 : 4,000<sup>17</sup>.

#### COMBINE DIATHERMY WITH ACRIFLAVINE APPLICATIONS.

The writer in the use of acriflavine for cervical and vaginal infections makes a topical application of a one per cent solution and immediately follows this application with a twenty to thirty minute diathermy treatment—one electrode is placed in the vagina and the other over the pelvis. This procedure has two advantages. First, heat increases the bacteriostatic effect of dyes and, second, the gonococcus can survive only a short time in a temperature of 104 degrees or over.

While the results obtained from the use of acriflavine have been better than those obtained by the use of antiseptics, acriflavine has not given the uniform good results in the hands of all practitioners which were claimed for it by Davis and Harrel, Watson, Burchfield and other army men<sup>18</sup> in the treatment of gonorrhea. Acriflavine has been used by Seal<sup>19</sup> in the treatment of otitis externa, by Ganguli<sup>20</sup> in ophthalmic practice and by Busch<sup>21</sup> in dermatology.

#### SELECTIVE ACTION OF MIXTURES OF DYES.

Churchman<sup>22</sup> has studied several other dyes in their selective action on bacteria. He has given much time to the research of a mixture which will have the combined bacteriostatic value of two dyes, one selective for gram-positive organisms and the other for gram-negative organisms. This he terms "complementary selective bacteriostasis." The only one thus far demonstrated is a mixture of gentian violet and acriflavine<sup>22</sup>. This is a very important contribution to therapeutics, especially in the use of dyes as a first aid measure and as a means of giving immediate treatment to desperate cases without the necessity of waiting for blood or urine cultures. Here, at last, seems to be the nearest approach to a non-toxic, non-irritating, general bactericide which has been discovered, a simple mixture of two dyes, gentian violet and acriflavine. This mixture is said by Churchman to combine "the selective features of the two dyes, being bactericidal for all common organisms, more efficacious than either dye used alone." It can

be administered either intravenously or orally and can be used for both topical application and lavage.

#### OTHER DYES USED IN THERAPY.

The length of this article will not permit of a summary of the results of the studies of a number of German investigators, Titze<sup>30</sup>, Bierbaum<sup>31</sup>, Rost<sup>32</sup> and Ziess<sup>34</sup> on the therapeutic possibilities of eosin, or of the studies of Churchman and others on fuschin. There is one antiseptic not an anilin dye, which nevertheless stains tissues so deeply that we cannot pass it without a word of comment, and that is a substance bearing the trade name of mercurochrome. It is advertised by the manufacturers in their house literature and through the medium of the leading medical journals to "replace tincture of iodine as a general antiseptic and first aid prophylactic." Emphasis is placed on the fact that it "stains." Is it a general antiseptic? Can it be administered intravenously to combat all forms of sepsis? The author has been unable to find in medical literature any evidence that would warrant such a deduction. Proof seems to be lacking that it has bactericidal powers for both gram-positive and gram-negative organisms. Young<sup>10</sup> and others<sup>28</sup> have in clinical use found it effective in sepsis due to the colon bacillus, and there seems to be some evidence that it is useful in sepsis due to the streptococcus. That certainly is virtue enough to give it a place in medicine. Why claim more? Young and others have not found it effective in sepsis due to the staphylococcus. The colon bacillus will flourish under the influence of gentian violet, and evidence is wanting to show that the staphylococcus is inhibited by mercurochrome. Dyes must be studied for their selective action. It is just as grievous a mistake to administer mercurochrome for a case of sepsis due to the staphylococcus as it would be to administer gentian violet for a case of sepsis due to the colon bacillus. Such a mistake may result in the loss of a life that otherwise might have been saved.

So far, according to Churchman, the only preparation that seems to be bactericidal for both gram-positive and gram-negative organisms is a mixture of gentian violet and acriflavine.

#### METHYLENE BLUE IN MEDICINE.

Methylene blue was first used in medicine by Ehrlich<sup>1</sup>. It has bactericidal powers for some of the gram-negative organisms, particularly

for the plasmodium malaria and for the gonococcus and has been used with some success in infections due to these organisms<sup>22</sup>. Laboratory and clinical studies are wanting to determine the dosage and method of administration that would be most effective.

That methylene blue, however, has a place in medicine as a valuable hemastat was brought to the attention of the medical profession by Perdue in 1921<sup>23</sup>. Methylene blue has been found clinically to be especially valuable in the control of slow-oozing, venous hemorrhage from mucous membranes in accessible parts of the body. A solution of 1: 1,000 of sterile tap water is used.

This may be injected into the bladder or rectum or applied on cotton as a vaginal or rectal or nasal pack, or on cotton held in place by an applicator to arrest hemorrhage of the pharynx. It is given by mouth for hemorrhage of the stomach. It has been successfully used by injection into the pleural cavity to check a condition known as hemothorax<sup>24</sup>. Perdue thinks the hemostatic action of methylene blue is one of stimulation to contraction of the vessels and tissues so as to narrow and close the lumen of vessels not so large as to require clamping or ligation. Thus far no unfavorable reactions and no contra-indications have been noted.

#### DYES IN DIAGNOSIS.

Ehrlich<sup>25</sup> in 1886 was the first to demonstrate the usefulness of dyes in "vital staining" as an aid in diagnosis and to advocate its adoption. But this idea like his idea of the usefulness of dyes in therapy, the efficacy of which depends on their power to stain living tissues received little attention until Wilson in 1915 applied it to the diagnosis of tissue fresh from the operating room<sup>26</sup>. Just why a living cell is stained by a neutral or basic dye, while a dead cell is stained by an acid dye, is still problematic. Whether this difference in the taking of the stain is due to the presence of negative charged ions in the living cell, and to positive charged particles in the dead cell, or to a peculiar quality of definite selective permeability of the living cells is a subject for further investigation. Whatever the answer may be, the fact is that at the Mayo Clinic "vital stains" are being used for the diagnosis of pathological secretions<sup>27</sup>. A stain to be classified as "vital" must be non-toxic and capable of combining with some element in the cells in order to accumulate in the protoplasm.

Sabin<sup>28</sup> in a recent study of human blood gives the basis for thinking that the application of vital stains to living tissues has great promise, and Hager is convinced that a study of pathologic blood by the use of vital stains may offer a most instructive investigation and may contribute a most important addition to our diagnostic methods.

#### SUMMARY.

1. No one germicide which will destroy all kinds of bacteria and at the same time be non-toxic to the system, and non-injurious to the tissues to which it is applied has thus far been found. Dyes come nearer to meeting these requirements than any other substances which have germicidal power.

2. Gentian violet is bactericidal for practically all gram-positive organisms. It has been found effective in the treatment of infective arthritis, in empyema, in puerperal sepsis, in osteomyelitis, in sinusitis, in mucous colitis and in local abscesses where the offending organism is gram-positive.

3. Acriflavine is bactericidal for nearly all gram-negative organisms, though perhaps not to the same degree of efficiency that gentian violet is bactericidal for gram-positive organisms. It has been used successfully in the treatment of gonorrhea and of the infections of the intestinal tract due to gram-negative organisms.

4. A mixture of gentian violet and acriflavine is bactericidal for both gram-negative and gram-positive organisms.

Both of these dyes are non-toxic and non-irritating. Both may be administered by the intravenous route with safety. Both may be given orally. Both may be injected into infected cavities or other septic foci. Both may be applied topically or used as a lavage.

5. Methylene blue has some value as a bactericide. It is a valuable hemastat for oozing hemorrhages from mucous membranes.

6. The efficiency of these dyes is increased when they are used hot, or when the tissues to which they are applied or into which they are injected are heated.

7. Vital staining bears promise of becoming a valuable aid in diagnosis.

#### REMARKS.

Dyes are a valuable addition to the armamentarium of physicians, and physicians should be equipped to use them in both office

and hospital practice. No expensive equipment is necessary. The results obtained in the proper therapeutic use of dyes will often avert the necessity for surgical interference, especially in empyema and other localized infections. A few cents worth of gentian violet may prove a godsend to a doctor unable to secure diphtheria or tetanus antitoxin.

If possible, ascertain the nature of the offending organism and on this information select the dye to be used. If the case is desperate, lose no time, use a mixture of gentian violet and acriflavine. Think of methylene blue for oozing hemorrhages.

1730 Eye St.

#### DISCUSSION

Dr. R. S. Westaby (Madison, S. D.): I hadn't intended to discuss any of the papers, but here is an opportunity to say a word in praise of this splendid paper that we have just heard.

I think it most important to know the action of these anilin dyes, and I am going to report one case. One of the bacteria which was not mentioned as being particularly susceptible to gentian violet is the bacillus of gas gangrene. It was our misfortune, or fortune, that a case developed in our hospital the first part of September. An automobile accident had seriously macerated the arm of a lady, who was brought to the hospital. All precaution was used to prevent infection, but after the second day a very extensive gas gangrene complicated our efforts. We immediately amputated high and left the wound wide open and used all the other precautions known to eradicate the disease. Even after our high amputation we noticed some infection around the stump, so we knew that we still had a desperate case. But, having read some of the work of Young and Hill in the use of gentian violet intravenously, we immediately used 10 c.c. of one per cent solution of gentian violet intravenously.

The condition of the patient improved. However, I want to give you this information—a patient does not look very well after being given the 10 c.c. of one per cent gentian violet. In fact, he looks a great deal worse than he does under the actinic ray.

Chairman Sherman: How long does that last, Doctor?

Dr. Westaby: This seemed to last about twelve hours. We noticed quite a decided hue of gentian violet.

After the second day we gave another 10 c.c. dose of gentian violet and the patient went on to a good recovery.

Dr. A. David Willmoth (Louisville): I know very little of the therapeutic action of dyes except insofar as I have used the various dyes to make a better optical contact for the ultra violet lamp. A one to one-thousandth aqueous solution of the dye in glycerin is used in fistulous tracts to produce a photo-sensitive agent that will permeate every portion of the fistulous tract and by so doing allow the rays of light to be carried to the remotest parts, and in that way get better results.

Of course, here we have to avoid the use of the methylene blues and the brilliant greens on the surface because of their staining effect, but they can be used in the fistulous tract.

There was one agent referred to by the essayist and to which I wish to refer and that is mercurochrome. While I am aware, as no doubt all of you are, of the many extravagant claims made for it in literature and many of them also in articles that appear from time to time in literature of which all have access to, yet I want to say to you that I consider it a very dangerous drug. As to its use in preparing operative fields, I have had no personal experience, but one of my friends and colleagues in the hospital where I do my surgical gynecological work tried it on quite a number of cases and he told me that it had no effect that he could see, that he got an infection (fortunately not a fatal one) in every case where he had tried to substitute it for the use of iodine, and he warned me against the use of it as an agent for preparing the abdominal wall.

I give you this observation in hope that it will perhaps keep some of the rest of you from experiencing these detrimental effects.

Dr. Folkmar: I have never noted a change in color from the intravenous administration of 10 c.c. of a one per cent solution of gentian violet. I had one case look very blue after a dose of four grains of the dye, but the color disappeared after about an hour.

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## The X Ray Therapy of Infective Tonsils and Adenoids: With Case Reports\*

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ON account of the far reaching effect of focal infection from teeth or tonsils, and thus being a causative factor in the great majority of cases of illness of those consulting the general practitioner, tonsil therapy of one kind or another occupies a foremost place of importance in the work of the entire medical profession, and has become an important field in the attention of the public.

As the removal of tonsils, though in itself a trivial operation, is sometimes disappointing in its results, other methods of treatment are coming into prominence, chief of which is x ray therapy. Probably we are all free to admit a feeling of self condemnation on looking over our tonsillectomy operations of past years. The chief difficulty in operating is in making a complete removal of all tonsil tissue, for as long as any part of it remains the patient is exposed to a recurrence of sore throat, or the disease for which the tonsils have been removed is likely to remain a source of danger to the patient. After operation, there is in many cases a condition of chronic pharyngitis lasting for months, which we apologetically try to explain to the patient by telling him that it will be all right when he recovers from the effect of the operation. Then there is the danger of damage to other important structures of the throat that leaves more or less permanent impairment of function, also the danger attending the taking of an anesthetic, (a danger which is not lightly considered by those who have encountered some fatalities), also the danger of complications following the operation, as well as the pain and discomfort of a very sore throat for a couple of weeks after.

It is not the wish of the writer to antagonize the advocates of surgery by anything contained in this paper. The views as stated are based on the results of a large number of tonsillectomies covering a period of twenty-five years, and compared with x ray therapy.

Very many people are averse to surgery for the removal of tonsils, but readily consent to the x ray treatment as it is painless and leaves the throat in its natural condition.

Patients past middle life, those debilitated by some intercurrent disease, such as chronic valvular disease of the heart with decompensation, arteriosclerosis, diabetes, nephritis, goitre, advanced forms of rheumatism—all these are poor operative risks, and are successfully treated by x ray therapy.

In cases where the tonsils have been removed surgically and the submaxillary glands have remained sore and swollen, where some form of rheumatism has remained, it is not unusual to see continued improvement of all symptoms from the first x ray treatment.

Gilbert Lansdown of Winnipeg claims the only verdict permissible after tonsillectomy is—"No Tonsil, No Damage." If this object could always be achieved, the success of the operation would be one hundred per cent; but the operation is not as easy as it seems and the results are not so good.

The object of x ray therapy of infective tonsils is the permanent removal of all pathological tissue from the throat, leaving the parts in their normal condition, and with permanent relief from the disease, local or remote, for which treatment has been undertaken. We are free to admit this is a large order, but when we consider the few years x ray therapy of tonsils has been in vogue, have we not good reason to be proud of the results? And have we not every reason to expect that it will be only a short time till the result of this work will be one hundred per cent efficiency?

The result of x ray therapy of diseased tonsils, adenoids, or pharyngeal tissue, is not to be measured by the presence or absence of pus organisms in the secretions of these parts, for they are constantly bathed in the secretions that come from the mouth and nose, but rather by the relief or cure of the complaint for which the treatment has been undertaken.

A skin lesion that disappears after the treatment of an unhealthy condition of the throat is

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to be considered a cure, and on later examination, we do not care whether there are pus organisms found in the secretions of the throat or not. The chronic bronchitis that disappears after x ray therapy and never returns, is to be considered a cure. The individual that does not know what it is to come through the winter without an attack of pneumonia, has his attack cut short by x ray therapy of an infected pair of tonsils, has the right to say he is cured. Or, if a child after having a course of x ray treatments for follicular tonsillitis, promptly has another attack with all the usual symptoms, we say the treatment has been a failure.

During the last two years the writer has treated quite a number of cases of infected tonsils for different purposes and with varying results. He is free to admit there have been some failures, but on looking over the work, is confident the number can be greatly reduced by making careful examination as to the cause and paying more attention to the same. With-erby's claim of 80 per cent of cures is a very modest one.

The irregular patient offers a poor prospect of success. The patient with a short, thick neck, or the stout, thick set individual, past middle life, will require more treatments, and the dosage gradually increased. It would seem that many of the recurrences result from the fact of idiosyncrasy, or our lack of knowledge of the dosage required for each individual case. It was noticed that cases of recurrence would not become tanned on using two filters instead of three, also that the time of treatment could be extended. Improper mechanical adjustment of the patient, or the machine, or both, is sure to produce a disappointment.

The most of the recurrent cases have been among children. This may be on account of the larger amount of lymph tissue in the tonsil of the younger subject and a consequent poor contraction of the fibrous stroma. An opinion prevails among the laity that a pair of tonsils very badly diseased will not respond to x ray treatment, and should be removed. The writer has repeatedly noticed the contrary to be the case. On account of some recurrent tonsillitis in cases treated, the treatments are continued, using an eight-inch spark gap instead of a seven and sometimes using four filters instead of three.

The usual technique followed is that of Dr. Richards of Toronto—seven inch spark gap, five milliamperes, three filters of aluminum, 10

inches distance, five minutes time. Eight treatments or as many more as necessary are given two weeks apart. In following this technique one meets with many idiosyncrasies, some individuals being affected so much earlier than others, that one should always examine the patient carefully before each treatment for signs of tanning, soreness in the glandular or muscular structures of the neck, or dryness of the mouth or throat, the result of previous treatments. The dryness of the mouth is usually produced by allowing the opening in the protective to invade too much of the region of the parotid gland. Often a patient, after having undergone several treatments, will complain of so much severe pain and difficulty in swallowing, that one is surprised to find that it is due to the previous treatment and not to another attack of tonsillitis. One usually feels safer in holding up the treatment in these cases, but the end results are good.

The danger of the patient coming in contact with the current is not very great where a well grounded wooden table is used, plenty of protective lead rubber, and the patient is under the constant and vigilant eye of a well trained technician. Young children may require special apparatus for protection, or should be held over till old enough to be well under the control of the technician.

The danger of x ray burns is not very serious, providing the technician uses the proper machine setting and does not forget to put in the necessary number of filters. Most x ray burns are caused by neglect to put in the filters. **CASE NO. 1:** Male, age 14, Aug. 22, 1922. Has been pale and in delicate health for sometime. Patient is also undersize and under weight, not able to ride his wheel or to keep up his end of the sports with the boys on account of weakness and shortness of breath. Has been behind with his studies and at school only about half time on account of frequent colds and digestive disturbances. Was scarcely ever without a cough and of late has been running a temperature of 100 degrees to 101 degrees. He is a mouth breather.

Physical examination of the chest shows dullness on percussion over the upper part of both lungs, with the respiratory murmur harsh and prolonged on expiration.

Radiographic pictures of the chest shows: (a) Deficient illumination over the greater part of the left pulmonic field, and some over the right.

(b) General hypervascularization with markings extending very perceptibly into the upper third of the left pulmonic field.

(c) Heart shadow much enlarged with the right and left borders bulging.

Examination of the throat shows the usual enlarged, unhealthy pair of tonsils with the pillars also affected. The submaxillary glands are also much enlarged.

He was kept in bed till the temperature became normal, then was given the usual number of x ray treatments for the infected tonsils. Once after the treatments were finished he complained of a slight soreness in his throat on swallowing. One x ray treatment was given and the sore throat disappeared for good. At the present time the tonsils are normal in size and appearance. The enlargement of the submaxillary glands has disappeared, but by the way he holds his mouth open, one would expect to find adenoids but they, too, have disappeared since the treatment of the tonsils. He never has a cold or a cough and is a good student at school and always ready and able to play games. He weighed 83 pounds when he commenced treatment on Aug. 22, 1922, and stands at 120 pounds now. He has grown four inches in height since the commencement of treatment.

**CASE NO. 2:** Female, age 9 years. Came to my office for treatment of a bad attack of chorea of a year's standing. Two years of age she had both tonsils removed. At present has sore throat and pains in the ankles. Right tonsil very large with crypts red and open. On the left there is the remnant of the former tonsil which shows enlargement. Has had four x ray treatments and all signs of St. Vitus have disappeared. Treatments being continued.

**CASE NO. 3:** Female, age 52 years, with rheumatoid arthritis. Physical examination revealed tonsils large, red and crypts discharging muco-pus. After four x ray treatments, tonsils presented as small pale masses of fibrous tissue. Rheumatoid pain and stiffness, which was severe enough to keep the patient awake for nights together, are practically gone. Treatments are being continued.

**CASE NO. 4:** Male, age 52 years. Patient is a farmer with a thick, short neck and massive jaw. Came to office August, 1923, complaining that he is not up to par and thinks there is some poison taking his strength. Breath is

offensive. He tires readily on exertion. Throat gets sore but never had quinsy. Tonsils red and moderate in size.

From Aug. 7th, 1923, to Jan. 9th, 1924, patient was given ten x ray treatments with the usual technique and appeared to be improved in general health. Next came under observation May 14th, 1924, with many of his joints stiff, swollen and deformed with arthritis. From May until October, 1924, he has taken ten more treatments, with the result that his joints are about normal.

**CASE NO. 5:** Female, age 30 years. Patient has always been subject to throat trouble. Her tonsils were removed several years ago.

Remnants of tonsil tissue were present on both sides. Three treatments were given. At the fourth treatment, after giving the left tonsil three minutes exposure, it was observed that the filters had been forgotten. In two weeks a ring of erythema on the left side appeared, and no further treatments were given. After eleven months, patient returned with a slight tanning of the skin on the left following the erythematous ring. The right side showed a mass of red inflamed tonsil tissue with corresponding painful, glandular swelling. It was interesting to note the absence of trouble on the left, which is conclusive proof of the therapeutic efficiency of the treatment. The logical conclusion was the left had quite sufficient treatment to cause a cure, while the right had not. What we would like to know is the necessary dose to give without endangering the patient.

**CASE NO. 6:** Female, age 42 years, nurse. Patient has infected tonsils and is subject to muscular rheumatism and neuritis. A nose and throat specialist of good standing removed both tonsils about two years ago. When patient presented herself she had just returned to her professional duties following a summer's rest and feeling not very much relief from her rheumatic pains. The throat presented the absence of the anterior pillars and a small piece of tonsillar tissue on each side situated well down the throat. From crypts of these pieces of tonsil tissue, exuded muco-pus. The patient is being treated with the x ray. This case is mentioned to call attention to the difficulty of tonsilleectomy even in skilled hands, and the failure to get relief from the disease for which the operation was performed.

**CASE NO. 7:** (aet. 8). Patient unusually fat and well developed. Has had frequent attacks

of tonsillitis with accompanying gastro-intestinal and respiratory ailments.

Gave her eight treatments with a six inch spark gap. In two months she had another attack of tonsillitis and the tonsils exuded a muco-pus from the follicles.

She was given eleven more treatments, using the six inch spark gap. Eight months later she had a severe attack of tonsillitis but each of these attacks has been of a milder nature, and she has had far less sickness from colds and stomach trouble than before the x ray treatment.

At the present time she is getting a third course, using an eight inch gap with other factors of the technique the same.

Out of 100 cases treated, while quite a number required many more than the usual eight treatments, the above case is the only one to have contracted a second attack of tonsillitis following the treatment. Yet this treatment will eventually cure her if carried far enough.

**CASE NO. 8:** (aet. 20), university student. Every time he got wet he would have an attack of articular rheumatism.

Was given ten x ray treatments. He began to improve from the first and has had no rheumatism or sore throat since commencement

of the treatment over a year ago. Quite evident that the infective tonsils were the cause of his rheumatism.

**CASE NO. 9:** (aet. 19), a farmer's daughter. Had a severe attack of pneumonia and it appeared that a pair of very large septic tonsils was the cause, as the trouble made its appearance every winter.

From January to October she had nine x ray treatments with a six inch spark gap. The tonsils were much reduced in size and became a nice pale pink color. Once last winter she had a cold but the tonsils remained the same nice pale pink and she escaped her usual attack of pneumonia.

**CASE NO. 10:** (aet. 22). Suffered from chorea and stomach trouble for several years.

From December, 1923, until the following May, she took nine treatments for a pair of infective tonsils and has been entirely well ever since.

A final report of many of the cases cannot be given at the present time as too short a period has elapsed since treatment, but it is the firm conviction of the writer that we can cure every case of infected tonsils and adenoids with x ray therapy if we have the co-operation of the patient and are willing to follow up the case with reasonable intelligence and persistence.

## Epithelioma of the Face, Head and Neck\*

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**T**HERE are three types of epithelioma involving the face, head and neck. They are the superficial, deep seated and papillomatous.

**Superficial Variety:** This is the most frequent epithelioma and consists of a small firm, reddish, or yellowish pearly papule or tubercle. It may start as a small abrasion which slowly enlarges and fails to heal under ordinary treatment. The warty or mole-like formation is finally replaced by a degenerative action and in a great part to a surface ulceration a trifle larger than the lesion which it

has gradually replaced. The basal portion is covered by a thin or slightly thick incrustation. It may fall off from time to time with a new formation recurring. The border is slightly elevated and often pearly and roll like which gradually pushes further as the ulcer enlarges. A purulent discharge may come under the crust formation. There may be a cicatricial healing in some types. The course is usually slow and may take years before serious progress is made. The lymph glands are rarely involved in this type until late.

**Deep Seated or Nodular Variety:** This may begin as a tubercle or nodule in the skin or subcutaneous tissues or it may originate from the superficial type. It gradually increases in

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all dimensions even projecting above the level of the skin. The nodule breaks down, an ulcer forms with prominent and infiltrated reddish and inflammatory looking borders. The surface is reddish and granular in appearance and secretes a viscid and ischorous discharge. This may crust over from time to time. There may be a considerable elevation of the edges. The infiltration is pronounced and spreads gradually, sometimes rapidly, the ulcer enlarging, the edge becoming harder, undermined and irregular in shape. The base bleeds very easily. The muscle cartilage and bone often become invaded. Neighboring lymph glands become involved.

**Papillary Variety:** The papillary or papilomatous type of epithelioma arises from the superficial or deep seated type or it may begin primarily as a papillary or warty growth. The base is moderately inflammatory and infiltrated. It is progressive and early involves the lymph glands.

#### ETIOLOGY.

The various parts of the face, especially the nose, eyelids, lips, cheeks, forehead, temporal region, ear and neck are the parts usually involved.

The most frequent predisposing factors producing epithelioma may be enumerated as:

1. Heredity.
2. Most frequent in the male sex.
3. Irritation and injuries.
4. Moles, warts and pigmented nevus.
5. Sun's rays, wind, freezing, etc.
6. Keratoses of old age.

#### PATHOLOGY.

The prickle or squamous cell arising from the Malpighian layer above the basal layer is the most highly malignant.

The basal cell type arises from the basal cells or hair follicles. The rodent ulcer is a good clinical description of this type.

#### DIAGNOSIS.

The diagnosis of epithelioma depends upon the recognition of the following factors:

1. Usually in old age.
2. Generally single in number.
3. Character of the border.
4. The beginning may be as a wart, mole, nodule or scurvy spot which refuses to heal. Any sore of unknown origin which does not heal in a reasonable time must be viewed with suspicion.

#### PROGNOSIS.

The prognosis depends upon the variety, extent, duration, rapidity of progress and glandular involvement. If taken early it is 100 per cent favorable.

#### TREATMENT.

The tumor mass itself is removed by electrocoagulation or surgical diathermy and the immediate area and the lymphatic areas which drain the region are treated by heavy x ray radiation.

*Electrocoagulation* is the coagulation of diseased tissues by the Oudin current or one pole of the d'Arsonval current and is to be used for the small, superficial lesions.

*Surgical diathermy* is the application of the high frequency currents for the destruction of tissues by the heat produced through the resistance offered by the tissues through which the current is forced, without sparking. The heat is generated in the tissues themselves and the temperature of the diseased area may be readily raised to a point of coagulation. Therefore, it is the penetrating power of this heat which is more beneficial than the thermic cautery, which destroys only by transmitted heat.

Surgical diathermy is produced by the bipolar method of the d'Arsonval current, and should be of low voltage, high amperage and extremely high frequency. The indifferent electrode is a piece of block tin about eight inches in diameter and is strapped to the patient's back or shoulders. This electrode can be wet with a soap lather or used dry. The main object is good contact; and strapping with a strong canvas binder is all that is needed. The active electrode is smaller and either made up of a point or some other suitable electrode as to the shape and size necessary.

In surgical diathermy or electrocoagulation it is necessary to use some anesthetic. For the superficial lesions which are not too large, a local anesthetic as novocain or some similar preparation is necessary. For the larger ones we use hyoscine, morphine and find H. M. C. satisfactory. The  $\frac{1}{4}$  grain morphine size is given about forty to sixty minutes before starting and a one-half dose is given, when the work is started, with sufficient chloroform to produce good narcosis. The patient seldom remembers having been taken to the operating room and the quantity of chloroform used is very small. Ether is not satisfactory on account of the danger of explosion. The

latter should never be used even though working on a distant part of the body.

The local application of sufficient heat to the tumor mass destroys the growth. Start administering a low degree of heat to the periphery of the tumor and beyond its limits. This results in the inhibition of the growth of the migrating tumor cells. The dissemination of these cells throughout the organism is further prevented by the occlusion of the lymph spaces and channels, and further by the formation of scar tissue which forms a most desirable barrier against the new growth. By diathermy the deep penetration of the high degree of heat destroys, or at least inhibits, instead of stimulating the neoplastic cells in the zone just beyond the periphery of the tumor mass. Surgical implantation of the tumor cells into healthy tissue is the unavoidable result of excision and dissemination of metastases by the opening of lymphatics and blood vessels is not prevented. By this method there is no possibility of transplanting or implanting cancer cells into new tissue. After burning the tumor at its periphery and beyond its limits, you approach the growth with a higher degree of heat burning the mass itself. The mass is entirely burned over then with a surgeon's curet, this mass is curetted, thus removing part of the same. Bleeding occurs very readily so long as the work is in diseased tissue. Repeated burning and curetting will soon pro-

duce a hard, dry condition which is indicative that the cancer mass has been destroyed. The dosage is accurate and owing to the extreme heat there is absolute sterilization of the wound. In a few days the growth is removed as a necrotic mass. The postoperative condition leads to a quick recovery, there being no postoperative shock and no pain. This makes it very valuable in the aged. During the time of the sloughing period, cleanliness and frequent dressings are to be used. It is found that powdered sugar applied to the area helps to keep down the objectionable odors. The mass gradually comes away leaving a clean ulcer which heals quite readily, but of course in extensive conditions it will occupy much time.

#### BRIEF CASE REPORTS.

Some hasty case reports may be in order. **CASE NO. 1:** This patient had previously had radiation over the ear and over the lymphatic glands, including the back of the neck, 2000,000 volts, and for a long period of time (about 800 milliamperes minutes). This was merely a precaution, there being no lymphatic involvement. We took this precaution in case the malignancy had already involved the cells.

After having had hyoscin and morphine some local anesthetic was administered which was infiltrated in and around the malignancy.

In treating the tumor first approach in the periphery of your tumor with the diathermy



Fig. 1—Epithelioma of the nose involving the cartilage.

Fig. 2—Same patient as in fig. 1 after treatment by surgical diathermy.

Fig. 3—Epithelioma in the region of the glabella.

Fig. 4—Same patient after treatment with surgical diathermy.

needle. For this particular case the one pole method was used on account of the danger of deep burning which is not necessary and which would destroy the cartilage of the ear.

In using the bipolar method in this condition a greater amount of deformity would be obtained. Burn well around the edge of the malignancy, first the good tissue and then gradually approach the growth and burn the same over the entire area.

Then with the ordinary sharp surgeon's curet scrape off this charred mass. This bleeds quite readily. The bleeding, however, is not bad, but just a general oozing. This mass is entirely scraped off and the area again burned over the entire surface.

Again curet away the charred area, less blood will come. Then burn again. When you get down to good tissue you have a dry, hard char which is firm and rather heavy scraping with the curet will not produce oozing of serum or blood.

Four or five days later, this char having not come away, you will begin to get your sloughing. This can very readily be lifted off in any manner that you care to employ.

A clean ulcer follows the char. Now surgical cleanliness and some bland ointment is all that is necessary. If you have your patient where you have good control of him, this ulcer will heal much faster by using the heat or radiant light and the air cooled ultra violet

lamp. It seems to keep the ulcer clean and promote healing.

It was not long before entire healing was obtained with very little deformity and without much scar. This scar is very soft and pliable, is not hard, and we have no difficulty with the scar only in people who have keloidal tendency.

**CASE NO. 2:** This patient is 94 years of age and has a very large malignancy of the lower lip, involving practically all of the lower lip down to the fold of the chin, and about one-third of the upper on the right side.

This patient was given hyosein, morphine and was chloroformed.

The bipolar method was used, strapping the plate firmly to his back. The entire lower lip was removed by surgical diathermy and the involved area of the upper lip, he having previously had high voltage x ray radiation.

After the slough has practically come away, you will see a large ulcer extending back into the corner of the mouth and part of the upper lip, but in a few weeks the lip was healed without much deformity.

At present, he closes his lips together very nicely and without deformity. Of course, this occurs because this man has no teeth. If he had had his natural teeth he would have been unable to have had this result. He is now 97 years of age, is still living, and there is no sign of recurrence.



Fig. 5—Epithelioma of the muco-cutaneous junction of the left half of the lower lip.

Fig. 6—Same patient as in fig. 5 immediately after treatment with surgical diathermia.

Fig. 7—Same patient as in fig. 5 after complete healing has taken place.

Fig. 8—Epithelioma near the inner canthus of the left eye.

Fig. 9—Same patient as in fig. 8 after treatment with surgical diathermia.

**CASE NO. 3:** This man had a large malignancy of the lower lip with an involvement of the inferior maxillary bone. No promise was made only to relieve the pain of the lip and heal the condition, if possible. The healing took place very readily but later the lymphatic involvement in the neck and the bone metastases destroyed his life.

**CASE NO. 4:** I am treating at the present time, a patient with a definite cancerous involvement on the lower lip. This lip had been treated by radium and x rayed very heavily without success and with a great amount of scar tissue. The electrocoagulation removed the entire mass and almost half of the upper and lower lip.

This ulcer just healed a few weeks ago and will soon have a plastic operation to close that deformity. Plastic surgery is necessary in some cases.

#### SUMMARY.

1. Immediate sterilization of the wound is produced as the heat destroys the mixed infection and the foul discharges.
2. There is immediate relief of pain.
3. There is no shock and practically no hemorrhage.
4. There is much less danger of extension and metastases than by surgery.
5. Recurrence is rare if treated before metastases has taken place.

#### DISCUSSION.

Dr. H. L. Pettit (Morrison, Ill.): I wanted to ask Dr. Yocom a few questions. One is what happens when the bony process is involved? Another is, when he removes the teeth in those cases, should the removal of the teeth be at the same time the coagulation is done or would it be harmful or dangerous on account of the metastases to remove the teeth before he began his work? Another, does he inject all of his anesthetic at the beginning?

Dr. A. David Willmoth (Louisville, Ky.): I have had a great deal of experience with this class of work and I was very much pleased to see the doctor's pictures shown here. I did not get to hear the paper.

I know of no method that has been of such assistance to the surgeon as the electrocoagulation of growths with the high frequency current. If you will use it a few times I am sure you won't go back to the knife. Most of you perhaps were present yesterday afternoon

when I showed the picture of the old gentleman with the tremendous carbuncle on the back of his neck and which I had coagulated and later treated with the lamp. That man was operated upon; he was 73 years old, was operated upon under a hyosein-morphin-cactin anesthesia and was sufficiently aroused at noon (this being in the morning) to take his lunch. There was not enough hemorrhage loss in that case to have soiled a white silk handkerchief. There was no hemorrhage; and there was no hemostatic used. So also can you coagulate cancers of the vulva, cancers of the uterus and the ones about the face. It is so easy that you can do it in your office. It has been my practice to have the nurse give to those who come into the office for work where the growths are rather extensive, first a small dose of morphine, say 1/6 of a grain, and allow them to wait either in one of your operating rooms, or in your reception room, for some thirty or forty minutes. They get under the influence of the morphine and it takes the nervousness away from them, then when you bring them into your operating room, with a little local anesthesia you can remove the growth without any trouble whatsoever. There is no pain if it is done properly and you can do it so thoroughly and so quickly that it is much better than if you were to attempt its removal with the knife. There is no hemorrhage, there is no shock, and it is the only way, I think, to remove these growths. The patient is glad to get through with it in one operation.

In regard to the local anesthetics, you should bear one thing in mind—where you infiltrate the tissues with the fluid you get, if you use much current, a certain amount of steam, and your destruction of tissue will be wider than you anticipate.

For a number of years it was a question with me how to obviate the terrible odor that most of these cases present if the growths are of any size. I want to give you a simple remedy and assure you that it will work every time, and it is harmless and can be had anywhere. It is powdered sugar. It makes no difference where the cancer is, just apply a paste of powdered sugar and it will kill that odor. If you have not the powdered sugar at hand, use the granulated. It is a little rough, and not quite so pleasant to the patient, but after you have moistened it and placed it on a cloth or gauze some sixteenths of an inch thick, there isn't much roughness to it. If you cannot get

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the powdered surgar the granulated will do just as well and it removes your odor within ten or twenty minutes. It does away with the unpleasantness that the hospitals and the other patients, if the patient is a ward case, object to, and the unpleasantness that both the doctor and the loved ones who have to take care of the patient have to contend with. It is simple, non-toxic, and is available in every home.

If you try electrocoagulation one time, you will be so much pleased with the action of *either* the unipolar or the bipolar current, that you will never again pick up a knife to remove these growths about the body.

The postoperative use of the ultra violet I think is very important because it hastens the healing process, it keeps down the infection, gives you a minimum scar and a very nice, soft elastic scar with no tendency to break down.

I believe, furthermore, that these cases should all be given x ray treatment. I believe there is a place here for the administration of x rays where you can probably catch cells that are farther out than you anticipated or probably farther than you wanted to go with the destruction of the other tissue. Personally I do that and I believe that it is better treatment; it gives the patient every benefit of the doubt; so also do I believe that every cancer case should be given instructions regarding their food and their surroundings. Above all

things, they should be instructed to watch their body for recurrences of other growths.

Dr. L. B. Williams (Toronto): This is a pet of mine where I want the *cosmetic* results, because ordinarily you can get them just as good as the *real* results. Whatever infiltration and secondary inflammatory action results from your treatment, in two or three days you will see that it will divide. I use the Sine wave all around that tissue and get the induration or stasis. Better blood circulation aids the healing, and I can tell you quite frankly, in the most cases you don't need to talk about the scar. By getting infiltration out, you get a good blood supply to your healing edge and if you keep lots of ammunition to the boys on the front line, they will go over the top without a scar.

Dr. A. L. Yocom: For a local anesthesia I use two per cent novocain beyond and under the growth. Do not put your needle directly into the edge of the tumor. This precaution prevents any danger of metastases.

In the lip case, with the inferior maxillary bone, it is best to leave that bone alone. You cannot cure a patient with metastases of the inferior maxillary bone following a lip carcinoma.

I mentioned in my paper the powdered sugar and found it very useful to stop the bad odors. Another thing to help keep down odor is simply Lysol or one of the cresols in hot water and kept in the room. It starts up one bad odor and overcomes the other.

## Pulmonary Tuberculosis and Tuberculous Peritonitis Treated by Actinic Ray\*

JOHN G. WALSH, B. Sc., M. D.,  
Woodbine, Iowa.

IN treating any diseased condition by any particular means, the question naturally arises as to the affect in the particular tissues treated. It is not my purpose in this paper to discuss the affect on the tissue treated, but to show the results. There are several articles by Pacini on this pathological aspect of the subject.

In treating this case and subsequent cases I dispensed with the radiant light and gave frac-

tional actinic ray treatment after the plan used by Röllier. The lamp was placed at 30 inches voltage through burner number 70.

The body is divided into five areas. The first day treatment was administered to the ankles, front and back for one minute. The second day the ankles were exposed for two minutes and the knees for one minute front and back. The third day three minutes exposure was given to ankles, two minutes to the knees and one minute to the hips front and back. The fourth day an additional minute was added and the treatment extended to the ribs. On the fifth day another minute was

\*Read at the Third Annual meeting of the American College of Radiology and Physiotherapy, Chicago, Nov. 14, 1925.

added and the distance extended to the head. After the fifteenth treatment, the lamp was brought closer to the body. The body was given fifteen minutes, front and back, after the fifteenth treatment. It does not seem to be any advantage to exceed this time.

It is found that blondes do not tolerate the ray in as large quantities as brunettes. It is also an observation that the improvement occurs with the tanning. Some men advise the giving of resorcin 1 gr. to hurry up the tanning. I have tried this in several cases but could see no pronounced effect.

It is well to supervise the treatments or at least to see that they are being carried out according to instructions. See that the lamp is generated properly before turning it on. See that the distance is right and other details are exact, as for example, a covering for the eyes.

Ultraviolet is not a cure for tuberculosis, but is merely an aid and help. It does not mean that because you have a lamp and turn it on your patient that that alone will get them well. It is supposed, theoretically, to fix the calcium content of the blood, and the blood chemists say that we have a blood calcium deficiency in tuberculosis. I believe ultraviolet ray to be one of the best agencies in the fight against this disease.

I will report a case that came to me for treatment some months ago.

This patient was a high school girl of 18 years, who had had an operation. On opening the abdomen the peritoneum was studded with the familiar millet seed. The appendix, ovaries and tubes were also involved. After the patient left the hospital she was advised to go to New Mexico.

It was at this time that she came into my service. She had a temperature of 102°, pulse 120-130, respiration 30 and hemaglobin 70 per cent. She was quite emaciated and easily exhausted. Physical and x ray examination showed involvement of both lungs.

She was put on daily ultraviolet ray treatment as described above. After seven treatments there was a noticeable improvement in her symptoms and condition and a diminution of cough. After twelve treatments she showed a marked improvement. Her appetite increased, her cough diminished and temperature and pulse approached more nearly normal.

After twenty-five treatments she was well tanned, her appetite was good, her temperature and pulse were normal and her weight increased. She was given about forty treatments after improvement became marked, two or three times a week. Her temperature was normal, pulse normal, appetite good and she had gained 25 pounds at discontinuance of treatment. Physical and x ray findings were negative and clinically she is well.

I have treated a number of cases in this manner and the results were all uniformly good.

Of course the patient must follow out the usual care along with the treatment, namely, regular hours of rest, cleanliness of person, care of bowels and a highly nutritious diet.

Actinic ray is not a specific for tuberculosis, but is one of the best agents in its control, together with proper care and hygiene. Along with the light, one must have proper regulation of diet, rest, drugs and use every means possible to restore the patient's health. With proper care and treatment we may expect a clinical cure in tuberculosis on an average of two to three months.

#### DISCUSSION

DR. J. H. LOWREY (Neola, Iowa): I have had quite a little experience along that line the last two years. About a year and a half ago a lady came to consult me. She had had a pleural pneumonia, which was followed by an empyema. She was sent to the hospital and operated upon, but after the operation she seemed to lose weight. She became very emaciated. She was running a daily temperature and the left lung harbored the empyema in a more or less complicated state. She had night sweats, her appetite was poor, she couldn't eat and apparently it was a very hopeless case.

The husband came to see me and requested medical advice. I made an examination and, although I encouraged the woman, I told the husband that the hopes looked very questionable. I never saw a woman so emaciated, but of course she couldn't eat. I applied the radiant light to her extremities, followed by the Sine wave treatment. I realized the first thing to do was to get her digestion improved so she could assimilate her food and get her bowels moving regularly to carry off the waste products. This I accomplished by the Morse treatment. A large pad is placed over the dorsal region and a small pad over first the ascend-

ing colon, then the transverse colon, then the descending colon. I gave her twenty to thirty minutes. I began with twenty, increasing gradually to thirty. A large pad was placed over this consolidated area on the back and front and diathermy was used on her chest. She was expectorating a little blood every day. A very mild current was used at first, for I considered it a little hazardous to use a heavy current when oozing is taking place.

Following the diathermy I gave her the actinic ray; every third or fourth day she got the actinic ray over the entire body. The Sine wave treatment was administered daily until the bowels acted normally and her digestion became re-established. She began to eat heartily until she developed trouble with her bowels. She was then given general radiant light, together with actinic ray, and towards the last she was getting thirty minutes of actinic ray at ten inch distance. She became tanned like a Mexican and in ninety days from the time I commenced the treatment this woman had gained twenty pounds and was absolutely well and the left lung had cleared up. She is well today. The husband came in and thanked me repeatedly for what I had done.

Treating tuberculous cases is not my specialty, but I have treated quite a number of those cases. The important thing is good digestion and assimilation. If you get that you can fight the disease, but regular elimination is essential. The appetite must be stimulated and the general condition improved. Then use the radiant light and the actinic treatment.

DR. OTIS: How long has that case been well?

DR. LOWERY: She came to me about a year and a half ago. She is about thirty-three or thirty-four.

DR. L. M. OTIS (Salina, O.): I wish to mention some observations on the radiant heat. I think the infrared ray is not the proper thing on a case of this kind. My own experience has been the checking up of a leukocyte count and frequently it is not beneficial. I think the infrared rays in these cases would be better omitted from the treatment.

DR. B. H. SHERMAN (Dexter, Iowa): I have had a somewhat similar but incomplete experience. This patient is a lady thirty-two years of age. She was operated upon for a tuberculous abscess, but the intestines were found

illustrative of the typical tuberculous peritonitis. This operation occurred eighteen months ago. For one year she has carried a fistula and the drainage has been going on all that time. Her weight decreased twenty-seven pounds under her normal weight. During this time the dressings were changed twice a day and I remember the first one made in the office. They were heavy and showed a diffused mixed infection of some type with a tuberculous basis. She has been under treatment now I believe about six weeks, the only treatment that she has had outside of fresh air and lots of sunshine. She has been under the actinic ray. The actinic ray and good food is all that was used. She has had no radiant light nor any other type of treatment, and no local treatment of the fistula.

Just before I left home I had occasion to see the dressings again and there was a spot there possibly the size of a dime, or maybe a nickel, and the fistula had completely disappeared. She has gained seventeen pounds in weight, and we feel that the one thing that has put her across has been the actinic ray. We did not follow the scheme of Rolliet; we simply gave her the usual treatments, one minute anteriorly and posteriorly, the first treatment and built up one minute each day until we got to fifteen minutes. I understood that fifteen minutes was about the maximum of treatment for that type of case.

I report this case because I feel that it has been a wonderful improvement and corroborates the statements made by the Doctor.

DR. T. A. KREUSER (Chicago): The Doctor spoke of using diathermy in the case he reported. I think stress should be laid upon the use of diathermy in these cases where there is hemorrhage, where the patient spits blood; and I do not think, from my experience, that diathermy is a conservative form of treatment in those cases.

It has been my experience that where you treat the body conditions and use the actinic ray for the local trouble and to enhance the blood condition of the body, you are doing the best for your patient without taking any unnecessary risks. I might emphasize that by stating that I have had cases under my care in which the cavities previously present in the lung after such routine treatment revealed scar tissue formation by roentgenological examination.

## Radiation in the Female Pelvis\*

D. Y. KEITH, M. D. and J. P. KEITH, M. D.  
Louisville, Ky.

**T**HERE have been many eras in the history of gynecology in which the principal treatment was either surgical or medical, medicine reigning supreme for centuries would be followed by some definite advance in a mechanical or surgical way which became well known in certain localities, then so completely forgotten that in a score of years it would be heralded as a new procedure.

From the inception of aseptic surgery, gynecological surgery has made a steady advance. So much relief was obtained by excellent surgery that most any sufferer would willingly seek relief from surgeon or gynecologist. The true gynecologist was and is always seeking something better, and a gynecologist is credited with having been the first to use radium in carcinoma of the cervix uteri.

So easy has relief been obtained in many diseases of the female pelvis by the judicious use of radium and the roentgen ray that a new era has arisen in gynecology until it can no longer be said that gynecology is a surgical art. The medical treatment, particularly the use of the endocrines, has so divided gynecology that cases are at present either medical, surgical, or a combination of the two. As radiology is neither a definite branch of medicine or surgery, it seems well adapted to gynecology. We as roentgenologists and radiotherapists are in a very unique position for the accomplishment of great good for the cause of gynecology. For on what is done by us in the next few years by close cooperation and association with the gynecologists depends the future welfare of gynecology. We trust that none of you will do anything but your best in the accomplishment of these results which, in our judgment, are to be accomplished along both the radiographic and radiotherapeutic lines.

Just as it has become generally known and accepted by most surgeons<sup>1</sup> that radium is the preferable agent in carcinoma of the cervix uteri, whether early or late in the disease, many of these same surgeons are beginning to accept radiation as the easier and safer method

for relief of fibroids<sup>2</sup> and are gradually extending therapy to fibroids of any size<sup>3</sup> (Schmitz, personal interview).

We have treated one large multinodular fibroid that completely blocked the pelvis, filling the entire abdomen so completely that the tumors were immovable so great was the intra-abdominal pressure. At the left costal margin there was one pedunculated fibroid nodule the size of a fetal head. All of these tumors have completely disappeared and the patient remains in excellent health today, nearly two years after the treatment was begun<sup>3</sup>. No treatment has been given since March 1st, 1921. The application of radium and x ray were both used in this case, and we feel there is little doubt that great benefit was obtained from both and it is very doubtful if a cure could have been obtained without the use of both agents. The abdominal measurement of this patient was forty-eight inches in circumference and a tricuspid and aortic obstructive lesion prevented even a thought of surgery. If a fibroid of this size can be relieved by radiation, why limit its use to small uncomplicated fibroids?

Our duty lies along two definite lines: (1), radiography of the pelvis or pelycography; (2), radiotherapy which includes radium and the roentgen ray.

### PELYCOGRAPHY

Pelycography, the name given by the late Dr. Van Zwaluwenburg to inflation of the pelvic cavity with gas and the use of stereoscopic plates, is in its infancy. Van Zwaluwenburg with the association of Dr. Reuben Peterson<sup>4</sup> has been of great service to radiology and gynecology in the work he so well began. Rubin of New York<sup>5</sup> by inflation of the abdomen through the cervix has done a great work toward testing the patency of the fallopian tubes. We feel there is little doubt that all of us should be very optimistic as to these procedures as they unquestionably will prove as invaluable as the pyelogram, the ureterogram and the cystogram as diagnostic agents in urology.

The wave of enthusiasm in pneumoperitonium, which includes the pelvis, is past and

\*Read at the Annual Meeting of the Texas Roentgen Society, 1922.

we believe and trust the wave of pessimism that usually accompanies any unusual procedure is also past, and we shall begin to tread on that common ground of realism in which great good can and will be accomplished. A few deaths occurring in probably unwisely selected cases is no reason for its abandonment. It is certainly as illuminating in some instances as exploratory laparotomy and certainly does not carry the same risk to life, to say nothing of the morbidity that will occasionally occur in the best surgeon's hands, that from postoperative adhesions which occurs in the best surgical families, and for which as you all know no definite cure can be expected.

We know you are all familiar with the radiographic work that has been done along diagnostic lines of the pelvis and we trust that those of you who are qualified by having had surgical training or are associated with gynecological surgeons, will continue to be optimistic about this work with a frequent citation or correlation of your results, for in this way we can get a definite knowledge from the experience of many workers as to what can and cannot be observed and demonstrated by pelycography.

If there is one field in radiology in which we should be optimistic, it is in illumination of the diseases of the female pelvis. All of you have more than once been called upon to make either a negative or a positive diagnosis of pregnancy in the early months or weeks of gestation, usually from the sixth to the tenth week, and have had to admit that the result of your efforts was either in doubt or absolutely valueless.

With pelycography your efforts would have been rewarded, a positive diagnosis made, a great service rendered to the patient, and friends made of the surgeon and physician. If I had one word to say for this diagnostic procedure it would be optimism.

For several months we have been inflating the colon to show contrast in the kidney shadows, tumors of the pelvis and suspected pregnancies with a great increase in information obtained. To those who are not prepared for pelycography or consider it too dangerous, we would recommend this method. In suspected pregnancies in some cases, according to what portion of the colon the gas accumulates, the information is as great as would be gained from pneumoperitoneum. As an example of its usefulness, we recently had a patient whose

weight was 320 pounds and after a cleansing enema of the colon and inflation of the colon with gas, we were able to visualize a fetal head and spine, making a positive diagnosis of pregnancy. This had been impossible by any other examination. She had been seen by six or seven men previously, some making a diagnosis of pregnancy, others of ascites, and others contending there was nothing present except adipose tissue.

#### RADIOTHERAPY

For a complete realization of our responsibility to mankind in the present development of radiation we should profit by the experiences and observations of former workers in medicine along surgical lines. Particularly is this true with the high voltage apparatus where we are using 200,000 volts or more, for it would be a great blow to roentgenology for our wave of enthusiasm to be followed by pessimism as has occurred many times in surgery when some brilliant surgeon by some special technique has carried the profession almost off its balance. We refer, as an illustration, to Lane and his brilliant surgery of the colon and of bone plating. There have been many sufferers from both.

All of us have seen and will continue to see occasionally some one who is suffering with morbidity as a result of some of the teachings of brilliant surgeons. To us many of these cases of morbidity are even worse than mortality. Let us then be cautious, careful, consistent and conscientious in our conservatism until we find where we are, lest a wave of pessimism follow on the good work that is being done. To prevent a repetition of the three eras of roentgen history so well divided by MacKee<sup>12</sup> into optimism, pessimism and realism, we must go cautiously in our work in using radiation externally, internally and interstitially lest we over-ray rather than under-ray and find that our patients though cured of a malignancy are suffering from morbidity following too much radiation.

We know all of you have seen the termination of the cases that were subjected to removal of both ovaries, and no one is able to estimate the amount of morbidity, suffering and mortality caused by this much exploited operation of a decade ago. The same holds true with the wave of optimism from appendectomy which was to cure mankind of most of the abdominal complaints.

If the high voltage radiation so often spoken of as the German technique was the Wertheim treatment of roentgenology, how much more careful ought we to be in the treatment of the female pelvis for malignancy when we are giving or are expected to give radium to the uterus, cervix, or to the broad ligament by a vaginal pack and x ray by as many portals of entry as are justifiable.

We should all know our limitations or the limitation of our apparatus which can be measured and which should be checked by as many methods as are practical. As to which will prove to be the most practical, only time will tell, and we are today laboring or will labor through the same obstacles that we did when we were dealing with Pastille's photographic densities and Koenbeck's strips, etc., of a few years ago at the birth of the Coolidge tube.

For measurements we have the double milliamperemeter concerning which Coolidge says<sup>7</sup>, "at 200,000 volts maximum with as much as 0.2 millimeters of copper filter, different high voltage tubes differ but little in output, the average deviation from the mean in the series of 20 tubes being only  $1\frac{1}{4}$  per cent." With the Universal tubes "only about 0.3 per cent using 3 millimeters of aluminum." Where no filter is used "there is a marked difference in the output" which he believes is due to the bulb thickness of the tube. Coolidge also says for medical application it looks much safer to judge x ray intensity and quality from sphere gap and milliamperemeter measurements of the electrical energy put into the tube than from the direct measurements made with an ionization chamber. Even with voltages from a transformer or an induction coil the resulting radiations differ in quantity and quality by scarcely more than the experimental error when the energy input is controlled by a standard sphere gap and a milliamperemeter. Shall our dosage be measured by sphere gap, milliamperemeters, filters and distance or shall it be measured in an ionization chamber or both? All of us will use both for a time but the electric measurements we believe will unquestionably prove more practical and supplant the ionization measurements entirely. Let all of us calibrate our instruments frequently and test by the ionization measurements until we know our apparatus and the results we are to obtain, which we believe can then be easily duplicated by electrical measurements.

As we all know it has been difficult to get ionization chambers, electroscopes, etc., for

measurement and when we did none of these were calibrated to skin dose, all of which has to be worked out by the medical man. As you know very few of us have the same definite idea as to what is a skin dose or an erythema dose, some relying on an epilation dose, others on a faint tanning short of epilation and others on a complete epilation with destruction of the superficial areas of the skin, in other words a blister. Until we arrive at a definite and accurate plan of skin dosage we will be going through the same difficulties as we are at present and as we have experienced in the past in the early days of the Coolidge tube.

Shall we attempt to determine the lethal tumor dose as suggested by Francis Carter Wood<sup>9,10</sup> with which we are sure you are familiar? Might it not be possible to so properly standardize our technique that we could easily differentiate; first, between a stimulating and an inhibiting dose to tumor cells; or second, tell the difference between the dose necessary to inhibit or kill cancer cells; and third, that which would cause serious injury or death to the patient, as we know the difference between these may be very small? An exact surface and depth dose is necessary. This is quite difficult at present for the lack of suitable instruments as none of them are calibrated in a standard skin erythema. Wood insists that the best way to calibrate this is by the use of a mouse tumor of constant and tested biological qualities or resistance. With a tumor that has been tested through so many generations and over a period of five years' time, it would be easy for us to test the dosage and compare the dosage with a dose of radium, as the radium dose on tumors of this type has been tested. If our work is to become so highly technical that it requires the full time of a physicist, of which there are very few available, very few of us will be in a position to be of great service to our community. For any method to be practical it should be a method that can be carried on by any man with average knowledge and with average ability and experience along that particular line. This will hold true whether it be surgery, medical appliances or radiotherapy.

With our present knowledge of the dose of radium to a lesion superficially and the percentage of radiation<sup>11</sup> reaching different depths, it seems we can soon arrive at a definite erythema dose as well as a deep dose for our particular apparatus; then we will be able by ordinary practical measurements of a tumor

within the pelvis to deliver any percentage of an erythema or depth dose that we desire to give. If this can be done, which with our present knowledge and past experience we should all be able to do, we will have made a great step toward a constant dose in any condition. What we then would have to deal with would be to determine, by our experience or the type of cell described by the pathologist, what is the death dose of this particular tumor and the accurate measurement of the tissue through which our radiation has to penetrate to reach the tumor, an equation which can only be reached by experience and judgment.

We should also by experience learn the different absorptive powers of different tissues. In a fat patient we should expect more absorption per centimeter of tissue of the rays than from a thin or average size patient.

A man's success will then be measured by his ability to judge the density of the material through which he expects to penetrate and his ability to accurately measure mechanically or by palpation the tumor depth in centimeters and the thickness of the tumor in centimeters. This will place the radiologist on the same basis as the surgeon with his medical training and surgical judgment, which determines the man's ability from a surgeon's point of view.

May we not all be expected to do our best, be recognized as real physicians, as we are, and place radiation therapy on a basis it so justly deserves? If we fail by being unqualified, by over enthusiasm, or by super-radiation, gynecology and radiation will suffer accordingly.

A few of the unpleasant late results in too much radiation are being reported, unquestionably others have occurred that are unreported. We refer to the breaking down of tissue as long as two years after radiation, the area seemingly being perfectly healed for months. Our word of warning at present would be to under-ray rather than over-ray.

Personally we know of three cases in which the immediate results were pleasing only to be followed by disaster. One a supraclavicular and infraclavicular metastasis that is at present having a disintegration of the lung substance. There was very little skin change. A voltage of more than 200,000 was applied for several hours. From a layman's point of view one case of this type will prevent many from coming for radiation.

McCandless<sup>8</sup> reports a death without skin changes due to deep tissue change. The same writer reports deep muscle induration with possible abscess as one of the latent effects with negligible skin changes.

As an illustration of results without great amounts of radiation or even high voltage, we wish to report one case of adenocarcinoma of the sigmoid, surgical diagnosis with microscopic proof. The patient is well, enjoying the best health of her life and free from any evidence of disease two years after treatment was instituted. Had this patient received an application of the penetrating short length rays a brilliant cure would have been reported ere this time. She has received only three series and two preventive doses.

The technique used was as follows:

Voltage 110,000, spark gap  $95\frac{1}{8}$  inch, 6 milliamperes, filters six aluminum, glass and leather, anode skin distance 8 inches, time 12 minutes, using three portals of entry anteriorly and three posteriorly to the pelvis.

Second series one month later. Third series two months later. Prophylactic series four months later and six months later, using the same technique except the time factor was eight minutes instead of twelve.

The patient was in my office May 1st, 1922, and in excellent health, free from any symptoms. Is this a cure?

Fluoroscopic and plate examination of the colon was negative for any suggestion of stricture.

*Operative History:* Mrs. W., age 32. Operation by Dr. Louis Frank.

"Gall bladder small, compressible, no stones, no adhesions. Pylorus normal. Appendix thickened, about four inches long and kinked. It lay to the outer side of and fixed to the cecum. Appendectomy in the usual manner.

"Pelvic examination showed the right tube and ovary normal. On the left side there was a mass which proved to be at the lower end of the sigmoid. This was adhered to the left tube and ovary, to the broad ligament and the uterus. The adhesions were separated and the left tube and ovary then appeared normal.

"The mass in the sigmoid wall was hard and nodular. There were several small glands on the peritoneal surface. One of these was excised and sent to the laboratory for diagnosis.

"As the patient or her husband had not been told of the possibility of such a condition or the gravity of the necessary operative procedure, it was deemed inadvisable to make further surgical procedure at this time. There was no attempt at removal of growth.

"Surgical diagnosis: carcinoma of the sigmoid and rectum.

"One month later the patient was discharged absolutely refusing any operative procedure which might result in an artificial anus or fecal fistula. She had been examined by Dr. Hanes with a proctoscope but never successfully. Postoperative convalescence good."

*Microscopical History:* "Gross Description—Specimen consists of small bits of pale yellow, soft tissue. Microscopical Description—Section shows fat and connective tissue with a few atypical, glandular structures and many leucocytes, chiefly lymphocytes. No positive evidence of lymphoid tissue. Microscopical Diagnosis: Apparently metastatic glands."

*Supplementary Microscopical Report Twelve Days Later:* "There is no lymphoid tissue in specimen received, which consists of fat and connective tissue in which are a few atypical, glandular structures lined with columnar epithelium. There is not sufficient evidence to make a histological diagnosis, but the atypical glandular structures away from the primary growth indicate malignancy."

(Signed) STUART GRAVES.

As we have previously stated, the above case report would have been a brilliant cure for deep roentgentherapy. Her results to date are as good as could be expected had she received both radium and deep therapy. We are sure all of you could pick an indefinite number of cases from your files with the above results by the older technique. In view of cases of this type and some of the disastrous results that will occasionally happen under the more intensive therapy, we hope our warning and caution will be taken in the proper spirit and prove to be of inestimable value to all of us.

If we have prevented one of you from having a single disastrous result, we feel our efforts will have been well repaid. May we go cautiously, earnestly and conservatively in our work, and there is little doubt if these points are kept before us that our optimism will not carry us off our balance, and the work of roentgenology in gynecology will in a short time reach its proper sphere.

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## X Ray Photographs Sent by Wire\*

GENERAL ELECTRIC COMPANY,  
Schenectady, N. Y.

**Q**UICK x ray diagnosis by eminent specialists have been made possible by telephoning x ray photographs. A negative showing the bone structure of the human hand was sent from New York to Chicago in seven minutes on Wednesday, April 15. Details were not lost in the procedure, and an accurate examination of the film was possible.

"The time element in the diagnosis of an injury or ailment by a specialist is most important," said W. S. Kendrick, vice-president of the Victor X Ray Corporation of Chicago, following the reception of the first telegraphed x ray negative. "In complicated fractures or other bone injuries, a quick diagnosis is invariably desirable in order to prevent infection or other complications. A saving of hours or days means everything to the patient."

\*Received for publication May 6, 1925.

During the recent tornado in the middle west, a woman received a severe fracture of the knee. The medical men available, who were not x ray specialists, were unable to treat her, and it was necessary to take her to New York. If an x ray film could have been sent by wire, a specialist would have been able to reply immediately with instructions for preventing permanent lameness or other complications without the necessity of going to New York. The possibility of sending the negatives by wire brings the specialist to the small community.

Dr. D. W. Coolidge of the General Electric Company has perfected a portable x ray equipment which a doctor can use anywhere by connecting it with the household lighting circuit. These widely-used outfits have eliminated the



Fig. 1—Print with dark background is a photograph of original x ray negative of hand, with ring on finger.

Fig. 2—Print with light background is a photograph of positive, printed from unretouched negative as received by wire in Chicago from New York.

necessity of moving a patient to a hospital for x ray examination, and now telephonic transmission of photographs indicates that soon it will not be necessary to take patients to large cities in order that the services of specialists be available.

"Medical consultation between doctors on x ray plates transmitted by radio or telegraph is a realization that should find a most useful place in these progressive times," said Dr. J. M. Steiner, x ray expert of Roosevelt Hospital, New York. "The quick transmission obtained by this method should afford untold satisfaction to both the consultant doctor and the anxious family. In New York hospitals, we frequently have patients who are either injured or taken ill while traveling. These pa-

tients, being in strange hands, naturally desire their home physician in consultation. If explicit information could be quickly transmitted to the home physician, much needless travel could be avoided, saving the home physician or family a trip to New York.

"Many times physicians in other cities, desiring an opinion from a New York consultant, could materially shorten a tedious delay if x ray plates were quickly transmitted by telegraph to New York consultants, who in turn could render an opinion within an hour or two where otherwise several days to a week or more might be involved. Written descriptions or word pictures even of such simple conditions as fractures are often most misleading, whereas the actual conditions shown graphically in x ray plates are more convincing."

## EDITORIAL

### *The* JOURNAL OF RADIOLOGY

A Journal of Ideas and Ideas.

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A. F. TYLER, M. D.  
Managing Editor

**ANNUAL MEETING**  
**American College of Radiology**  
**and Physiotherapy**  
**Chicago**  
**November 30, December 1, 2, 3**  
**Hotel Sherman**

FOURTH ANNUAL MEETING

**T**HE fourth annual meeting of the American College of Radiology and Physiotherapy will be held at Hotel Sherman, Chicago, on November 30th, December 1st, 2nd, and 3rd. The Program Committee consisting of Doctors A. R. Hollender, James C. Elson, and R. W. Fouts has been busily engaged in arranging

a program that will include every branch of physical therapy and which will be presented in such a way as to be of the greatest value to the medical mind. With the development of the present plans, this program promises to exceed even that one so deservedly received at the last meeting.

### Early Struggles and Present Status of Physiotherapy\*

CURRAN POPE, M. D.  
Louisville, Ky.

**I**T is in reminiscent mood in which I speak to you tonight. My mind travels back over the vista of the years and brings again to memories screen the early struggles of those who truly and justly bore and have earned the title of pioneers. I have seen the fall and rise, the battle and the struggle, the slow, painfully, slow, but never-the-less steady growth of knowledge and enlightenment until tonight I stand, with other defenders of the Faith viewing in the minds eye the victorious passage of the now triumphal modalities. The agonies of body, the torture of mind, the abysmal melancholy of rejections, are all forgotten in the healed wounds, the softened scars, in the joyousness of the success of a well merited

\*Delivered at the X Ray, Radium and Physiotherapy meeting, Omaha, Dec. 3, 1921.

victory. We can now with a feeling of safety and certainty "hang our banners on the outmost wall" and expect to hold our own "till Burnam Wood shall come to Dunsinane."

"Now is the winter of our discontent

Made glorious by this summer Sun of York."

And so tonight we may in a brief and somewhat disjointed manner review a few of the early struggles of those who born to the Faith in Physiotherapy have lived, and fought, have died and survived, to see a medical fraternity changing, bowing to that which they traduced and maligned, yet is mighty and will prevail; the *truth*; unchanging, beautiful, sublime. Every time I come to this your great Western Country, I like it better and better. I first came as a beardless youth to a ranch in Colorado. I was a *real* cowboy. I rode the plains and the mesa, crossed your arroyas, forded streams and gazed on the beauties of your splendid peaks through a translucent atmosphere that only the West can produce. I "rode the herd" in day and at night, in the vast stretches of prairie land. I have sat upon my "pinto" while my eyes roved a sea of great horns. I have seen in a vast valley compact packs of 40,000 cattle and these experiences have left a yearning and a love in me for the west, with its beauties and its cruelty, with its romance and with its achievements. In the later years as I have traveled over your western country I have seen great cities spring up where mere prairies existed before. I have looked from the car window and seen not 40,000 head of big-horn cattle but 400,000,000 groups of golden headed wheat, the staple food of our great country and in my trip here I was amply prepared for this meeting, dealing as it does with the electric modalities in which we are all greatly interested, because even in riding to the city of Omaha I was "electrified" because I came on the Chicago, Milwaukee and St. Paul railroad. The C. M. & St. P. has the longest and best stretch of electrified railroad in America.

I started my practice in the days when we had practically three currents. We had the galvanic made memorable, valuable and useful by the research work of those two wonderful, far-visioned and sight-seeing men, Beard and Rockwell. They made the galvanic current the practical handmaiden of the physician. Later Engleman of St. Louis gave us the uninterrupted current and his wonderful high tension coils. And it was Dr. Morton who taught

us that the static current and static machine was not an instrument solely for purposes of "psychic" influence but an instrument, potential enough to produce profound physical and biological reactions.

Among the many interesting things that I encountered in the "good old days" of yore was the fact that the medical profession were unable to understand the meaning of words. That has been the failing with the medical profession through many generations. They could not define the word "quackery" and what constituted quackery was to them anything that did not conform to a hidebound and limited treatment of medicine and surgery. *Quackery* does not consist of *what* we use in medicine, but quackery consists in how we use it and there can be no bigger quack if he wants to be than the big ethical surgeon or the big ethical medical man, provided his methods conform to this definition. As I said I started with the good old days of the static and the good old days of "psychic effect." Little did the medical profession dream that some day a great man would see that in these currents were molecular and atomic vibrations that were so powerful that neither brick nor cement nor yet the rock ribbed granite hills of our mountains could stop their vibrations and in which were unheard and unknown atomic universes. Science will yet sing a paen of songs that none of us today can even visage. From Kansas City in the old times a trail started winding across the plains, with its faint marks here and wagon tracks there. It wound north and west with the Platte in its serpentine course over hill and mesa into the Rocky mountain chain until it led eventually to the land of romance, to the land of promise, to the land of gold, to the land of hopes; and all along that trail were to be found the mementoes of lost hopes—here the blanched and picked bones of horses and cattle; there popping up from the sandy soil of the plain that was in later years to blossom with flowers and ripen with grain, stuck the grim and grinning skull of some poor unfortunate man or woman, who had been the sacrifice of the pioneer to possess the land. Looking further we saw the rims and the hubs of a wagon that once contained a happy, singing, hopeful people; and here a skeleton, between whose ribs an arrow that told the fateful tale of Indian massacre and death. But the Anglo-Saxon is a hard person to stop and so they kept over the trail and over the mountains until today this great west

is peopled with a population of which America is justly proud. And were we to start a sinuous trail from doctor's office to doctor's office we would find also the skeletons of lost hopes, of disappointments, of failures, of misunderstandings, of dust covered galvanics slowly rotting, occupying floor space in the office. "*because it had a good look.*" Those were different days when men had no opportunity that you have to receive instruction and help. They were days when a fellow rolled up his sleeves and if he was not able to carve out his destiny with his good right arm, figuratively speaking, he went down to defeat. And where one triumphed there were nine-hundred and ninety-nine of the skeletons and broken hopes that equalled the tragedies of the great trail from Kansas City to the coast.

And then again the scene shifts. All the time during this interim of which I am speaking men struggled and studied, treated and succeeded and all that they could get of encouragement from the medical profession was the "smile that won't come off," tintured with the sneer that was too agreeably pleasant to be enduring. Everything was the result of "psychic influences," until even this was changed to that charming proposition that it was no longer psychic effect but "suggestion." Suggestion did the work, not the galvanic or static currents. Results were due to suggestion even though chemical, thermic and mechanical effects were plainly visible and easily demonstrable. It looked as though medicine and surgery were never to awaken from a Rip Van Winkle sleep to a realization of the value of physical measures in the domain of therapy. It really seems as though it takes some catastrophe to shake up the medical profession to a realization of things real. Physical measures needed such a catastrophic shock to put them on a firm foundation. It was a great war. Do you realize that it took the lives and blood of twenty million men to make the medical profession realize that these treatments are real, actual, living modalities? And it took a great war to make the medical profession recognize physiotherapy. Today we are in the throes of a new era. It is a dangerous era. It is an era when men are apt with these remedies to misjudge and not to weigh; when they are apt to make of them the panacea for the evils of the flesh, as well as of the mind. But these modalities have in themselves certain powers and capacities only as the intelligence of the physician may understandingly apply them. Do

carefully what you do and do not overdo. And sometimes when in reflective mood, I want you not to forget the man who worked so hard and who bore so patiently the slings and arrows of outrageous fortune; who took up arms against a sea of troubles and fought on and on because of a faith not unlike the martyrs of old. If I were to express a hope it would be that I might see the final triumph of those things for which I have worked unceasingly. My hope and my prayer is that I may yet be given, through the Grace of God, time to see the full fruition, the complete recognition, the full evaluation of what I have longed for and dreamt of, for which I have hoped and prayed and struggled.

### Jean Alban Bergonie

A pioneer in the field of Radiology, Jean Alban Bergonie died at his home in Bordeaux on January 2nd, 1925, after a prolonged suffering from cancer resulting from radium lesions received in his work—a martyr to his science.

To understand the effort put forth by Dr. Bergonie in his establishment of Radiology and Electrology as a recognized medical adjunct, one needs only to repeat the outlined biographical notations. As an active member of l'Academie des Sciences and de la Legion d'Honneur, he received an early recognition. As a Professeur d'Electrologie Universite de Bordeaux, his teachings and inspirations to the young medical minds was invaluable. As founder of the Archives d'Electricite, he was able to proclaim and bring to the attention of all practitioners the advancements of his chosen work. As founder of the Section d'Electricite Medicale a l'Association Francaise pour l'Avancement des Sciences, in 1911, Dr. Bergonie obtained for Radiology and Electrology its rightful recognition by the medical profession of France. As founder of the Lutte Contre le Cancer, in 1921, he gave to humanity a research organization of unestimable value to carry on the work begun, and established for himself a monument to forever proclaim his deeds.

The qualifications of Dr. Bergonie may be grouped under three headings—any one of which would be considered a credit to his name—a scientist of the highest type, an inspiring teacher of physics to the future medical practitioners, and a graduate and practitioner of the art of medicine.

His kindness, courtesy, helpful and encouraging with constructive criticism, made him a leader of men. His vision, ambition, patriotism and keen intellect drove him to his persistent desire to establish France as the home of Electrology. His original contributions and numerous addresses typify the man as one with a definite goal in mind—disregarding nature's law for mental and physical limitations in his ambition to achieve this goal.

No greater tribute could be paid these scientific efforts that that voiced by an intimate friend, A. E. Dean: "He inspired the rejection of personal methods, vague hypotheses, hasty deductions, and generalized theories. He

pleaded for the adoption of careful observations, correct notes, exact measurements and experimental precision; which were exemplified when he was lecturing, defining a condition, criticising a statement or smoothing out a heated discussion, his mind was lucid, his arguments convincing, his words simple."

His self sacrifice was exemplified to the end when, as a final thought, he bequeathed his body to the Faculty of Medicine of Bordeaux, with the wish that the organs be examined and the findings published.

"Such was the man to the end. *Le Maître et L'Ami. Un Grand Français.*"

## ABSTRACTS *and* REVIEWS

*The Use and Abuse of X Rays in the Treatment of Common Skin Diseases.* EARL D. CRUTCHFIELD, M. D., New Orleans M. & S. J., 77:259-263, January, 1925.

IN this article, the author considers only unfiltered x rays, repeating the following laws pointed out by MacKee and Remer of New York, as those obeyed by unfiltered x radiation.

1. The amount of radiation varies as to the voltage, usually measured in terms of spark gap.
2. The amount of radiation varies as to the amount of milliamperage.
3. The amount of radiation varies directly as to the time.
4. The amount of radiation varies inversely as the square of the distance.

These laws expressed mathematically read as follows:

$$\frac{M. A. \times S. G. \times T.}{D^2} = \text{Dosage.}$$

The dosage of x rays administered varies with the age of the individual, sex, texture of skin, circulation, color, location and possible idiosyncrasy which should also be considered.

Frequently, x radiation is followed by generalized malaise, pyrexia, nausea, prostration and leukopenia. Severe sequellae may, and usually do, follow the administration of over one and one-fourth units of x ray to any one area of skin within a period of a month. Un-

fortunately many of these sequellae do not appear immediately and may be delayed for a period of years. The important sequellae that may follow the production of an erythema are: atrophy, telangiectasis, alopecia, scarring, tanning, freckling, keratoses, and later epithelioma may develop.

Since the action of the x rays is in the reduction of the cell division, it would seem that its greatest therapeutic application would be in those diseases where there is an increase in mitosis.

It is said that the x ray is the most valuable of all the therapeutic agencies in dermatology but it is a very powerful and dangerous remedy unless used with discretion. Never more than one skin unit should be administered within the period of a month and only in exceptional cases should more than a total of four units ever be administered. The most common skin conditions amenable to x ray is that general group of diseases which are classified as dermatitis and eczema. In conditions where there is exudation and considerable moisture, the writer has found that x ray is of little or no value.

In the persistent infantile eczema cases, x ray is the method of choice. The secondary eczematization seen in infectious eczematoid dermatitis is most amenable to x ray. In neurodermatitis, the intense itching may be relieved and the lesions healed within a period of four

to six weeks, using one-quarter to one-half unit doses of x ray. In its application to dermatitis venenata, the author has found x ray to be of little value except to allay the itching.

Of the diseases due to pyogenic organism, sycosis vulgaris stands first, paronychia second and chronic furunculosis third, as diseases indicating x ray treatment.

Of the granulomas, those tuberculous in character had responded most favorably to x ray therapy. Tuberculosis verrucosa cutis, sero-odermata and tuberculosis oraficialis have received the greatest benefit from x radiation while lupus vulgaris and Bazin's disease have not been materially benefited in the applications administered by the writer.

X rays have been discarded for radium and carbon dioxide snow for the treatment of such skin diseases as those belonging to the naevi and angioma group.

For the reduction of benign neoplasms, such as keloids, the use of unfiltered x rays has become a recognized therapeutic measure. The x rays in molluscum contagiosum, xanthoma, lipoma, multiple benign cystic epithelioma, and ulcerating granuloma of the pudenda have proved of no value.

The use of x rays in the treatment of leukemia cutis and in Hodgkin's disease has been of little value except in the temporary relief of the pruritis. In all forms of melanodermos, the use of the x rays is futile except in the so-called melanotic whitlow.

*Modern Treatment of Acne Vulgaris.* ROYCE B. JOSSELYN, M. D., J. Maine M. A., 16:5-7, January, 1925.

**A**CNE vulgaris is a condition that occurs in young people directly after puberty, a chronic inflammatory disease of the sebaceous glands, occurring most frequently on the face, back and chest, characterized by a hyperactivity of the sweat and sebaceous glands, and a thick, oily skin—an ideal soil for pustules.

In the treatment of this condition, x ray radiation occupies the most prominent position in our list of medical procedures. One-eighth of a skin unit is given to the front of the face and one-quarter of a skin unit is given to each side. These treatments are administered each week until relief is obtained—twelve to fifteen treatments are usually required. It is not necessary to say that attention is necessarily directed to the patient's general condition as well as to this specific manifestation of the diseases. The gastro-intestinal tract particularly

is kept in a normal functioning condition.

*Carcinoma of the Lip.* C. J. BROEMAN, M. D., West Virginia M. J., 20:27-31, January, 1925.

**C**ARCINOMATA of the lip are divided clinically into two distinct classes: true epithelioma, a squamous cell epithelioma, either superficial or deep; and basal cell epithelioma which is not a true epithelioma as it originates from the cutaneous surface beyond the mucocutaneous junction. It is this deep infiltrated type which is the most misleading in the establishment of a diagnosis. As a rule, the deep infiltrated epithelioma involves only a small portion of the mucous membrane, ulcerates early, has hard indurated edges and metastasizes early to the cervical glands.

In carcinoma of the lip, the glands of the neck are often not involved, but it is the routine of the author to thoroughly irradiate the entire region of lymphatic drainage, paying particular attention to the submaxillary and submental areas. This method has been successfully employed by the author in the treatment of over 200 cases, only two failures being recorded. One was in a case that had been previously exposed to extensive x ray therapy and had been pronounced as hopeless before the radium was applied. The other patient was suffering from an untreated syphilis at the time of treatment.

The technique used for the application of the radium to the basal cell carcinoma consists usually in one application of a carefully applied 10 milligram one-half radium plaque. The plaque is covered with 0.3 mm. brass filter and is allowed to remain in place for six hours. One-half hour is then given without the filter. If the six hours cannot be given at one sitting the dose is divided into two three-hour or three two-hour sittings.

For the treatment of the squamous cell epithelioma, the lymphatic glands on both sides of the neck, from ear to ear, are irradiated before the application is made to the lip. Palpable glands receive additional attention. The reason for this procedure is: (1), radium tends to block the lymphatics, preventing cancer cells from spreading; (2), few cancer cells are in the glands at this early stage and can be easily disposed of; (3), it increases the fibrosis of the glands thus walling off the migrating cancer cells.

The cervical region receives its radiation from radium applied in felt pads, one inch thick, the radium needles being contained in

brass tubes, and the radium tubes in silver and brass. The 25 mg. radium tubes are placed one-fourth of an inch apart. The radium is allowed to remain in position from twelve to fifteen hours, depending upon the type of skin under radiation. Glands that are distinctly palpable receive radium packs, needles or seeds, if necessary. The above routine is repeated in one or two months, depending on the case. Gamma radiation of at least five-eighths inch distance is applied in the cross-fire method. This tends to prevent the growth from spreading.

If under this treatment the lesion does not disappear, needles containing 5 mg. each of radium are inserted into the lip for from six to eight hours. Ordinarily the lesion is healed entirely in about two months time.

The reasons given by the author for his administration of radium read as follows:

1. A larger proportion of cases are cured with radium than with any other method.
2. There is no deformity, little loss of time, and the treatment is not painful.
3. Glandular metastases can be handled as successfully with radium as with the knife.

*Roentgenotherapy in Sarcoma of the Orbit.* G. E. PEHLER, M. D., J. A. M. A., 84:87-93, Jan. 10, 1925.

THERE are very few cases of sarcoma of the orbit reported in literature as having been treated by the roentgen rays. In this study, the author basis his observations on a series of 26 cases which came under his observation during the last twenty years.

Of this series, three primary cases of intra-ocular sarcoma were treated with the result that the disease has been arrested from three months to eighteen years. Fourteen cases of primary retrobulbar sarcoma have ended in two cases of failure, nine cases with freedom from symptoms at the end of from one to nine years, and three cases presenting extension of the disease to the frontal bone, which are improving under treatment at the present time. Nine cases of recurrent sarcoma of the orbit are included in this series. Six of these patients have resulted in fatalities. All but one showed a definite improvement lasting from two to fifteen months. One patient with osteosarcoma is apparently free from disease at the end of three and one-half years. One patient with sarcoma of the eyelid was well nine years, and is probably still well. One patient with melanotic sarcoma of the conjunctiva improved for a year, but died of metastases.

The technique of treatment has changed considerably during these twenty years of evolutionary changes. During the last ten years, a general technique might be given as: 9 inch parallel spark value, 5 ma. of current, and twenty minutes exposure, with filtered rays through a combination filter equivalent to 6 mm. of aluminum, and with a skin distance of 30 cm. From four to six portals of entry were used: (1), a field between the eyebrow and the eyelashes of the upper lids; (2), one above the eyebrow; (3), one below the eyelashes; (4), one or two fields in the temporal and zygomatic region, and (5), an oblique field through the intra-ocular region of the opposite side.

The conclusions of the author, based upon the above data, are as follows:

1. Irradiation has shown improvement, but has been an ultimate failure in nearly all recurrent cases of sarcoma of the orbit.
2. Roentgenotherapy has been successful in the majority of primary sarcomas of the orbit.
3. Roentgenotherapy has been the method of choice in all primary sarcomas of the orbit.
4. When used early, roentgenotherapy has shown prompt results, and has done no harm to normal tissues.
5. A biopsy for diagnostic purposes does not seem justified.
6. Skill and general medical knowledge is of as much importance in radiotherapy as in surgery.

*The Treatment of Sinusitis in Children.* J. C. BRASWELL, M. D., J. Oklahoma State M. A., 18:24, January, 1925.

A ROENTGENOGRAPHIC examination is an essential part in the examination of the sinuses. This examination is made to establish the presence and outline of the sinus. Without such an examination an outline as to the size and location would be impossible. Due to the great variation in the development in the sinuses, especially in the frontal region, such a procedure is extremely essential.

In the matter of diagnosis of the pathological condition, whether or not one exists, the x ray often can be incorrectly interpreted. Due to the thickness of the bone, a shadow may be present in some cases when the sinus is negative. In other cases, the film does not show the presence of pus, according to the interpretation of the author, for "clear pictures have been obtained where pus was later found by puncturing the maxillary sinus."

In infants and young children, the x ray plate should be very carefully studied in order

to ascertain the exact location of the floor of the sinus to the attachment of the inferior turbinate. If the floor of the sinus is above the inferior turbinate, the puncture is made through the middle turbinate.

The roentgenogram is used in conjunction with the examination of the nasopharynx, and establishes the diagnosis of a sphenoidal sinus infection.

*Ethmoid and Sphenoid Infections.* JOHN R. WALKER, M. D., J. Oklahoma State M. A., 18:1-2, January, 1925.

WHEN paranasal sinusitis is suspected in infants and young children, it is always well to determine what sinuses are present by the use of the x ray and of those present of any clinical importance. In the examination of the x ray picture, it is well to have firmly established a clear clinical history aided by a careful physical examination. Otherwise, a determination of the pathological condition existing, based on the x ray picture alone, is often misleading and may prejudice the surgeon in arriving at a correct diagnosis.

The interpretation of the x ray plate can only be made correctly by an expert who understands the physiology, anatomy, and pathological changes that are common and may be found in the parts to be rayed. "A thorough clinical examination, a painstaking history of the case, carefully reviewed by the physician and surgeon, will often reverse a diagnosis made upon the x ray findings alone."

*The Effect of Radiation Upon Tonsils and Adjacent Lymphoid Structures.* IRA O. DENAMN, M. D., F. A. C. S., J. Am. A. Med.-Phys. Research, 2:77-79, February, 1925.

RADIATION as a method of treatment for tonsillectomy has none of the contra-indications to meet that obstruct surgery. In the radiation of the tonsils, the lymphoid tissue is dissolved and sterilized, at the same time promotion of metabolism is effected and the fibrous tissue limiting the infection remains intact.

In the treatment of infected tonsils, the author advocates the use of the "Triad" of radiant energy. By means of the roentgen ray, the tonsil is made to shrink, by the destruction of the lymphoblast root cells, to which the prolonged growth of the lymphoid tissue is due. As the follicles undergo shrinkage, the crypts become shallower, the apertures widen, and become obliterated. The

focalized ultra violet light from the water cooled lamp is administered to the tonsils at this time. This light playing upon the tonsils and the fauces not only sterilizes their surfaces but promotes reconstructive metabolism in the remaining tissues. The large air cooled ultra violet light constitutes the third member of this triad. It is applied to either the chest, or the back, or the entire body receives its stimulatory rays. By its application metabolism is stimulated, systemic resistance is raised and the general health of the patient is markedly improved.

By this method not only the tonsils themselves are benefited, which really constitute a very small portion of the infected tissue, for the surrounding lymphoid structures of the pharynx and lingual regions which drain this area are also involved. By this means the entire inspissated area is sterilized.

Radiation removes the infected lymphoid tissue, leaving intact the protective fibrous border, and does not have the severe after effects such as shock and depression. There is no resulting scar tissue formation for throat deformity.

*X Ray Therapy in Chronic Pharyngitis and Tonsillitis.* W. D. WITHERBEE, M. D., J. Ophth., Otol. & Laryngol., 28:393-396, November, 1924.

ROENTGENOGRAPHY given previous to operation materially lessens the amount of dissection necessary for the removal of the tonsils, thereby decreasing the possibility of complications. Roentgenography is recommended by the author in the following cases:

1. Where an anesthetic or operation is contra-indicated.
2. Those cases past middle life where hemorrhage may cause complications due to a mild or severe arteriosclerosis.
3. Patients whose tonsils are embedded in infected tissue in which the operation may cause dissemination of septic emboli into the blood and lymph streams, thus producing lung abscesses, septicemia, endocarditis, etc.
4. Patients whose adjacent lymphatic structures (not removable by operation) are markedly infected.
5. Patients suffering from chronic cardiac lesions, Bright's disease, diabetes, exophthalmic goitre, chorea, rheumatism, hemophilia, asthma, tuberculosis, status, lymphaticus or any condition which has lowered the patient's general resistance.

6. Patients subject to frequent attacks of peritonsillar abscess (quinsy).

7. Vocalists and public speakers subject to frequent attacks of tonsillitis and pharyngitis.

8. Patients suffering from recurrent attacks of pharyngitis after removal of tonsils and adenoids.

Some of the unfavorable results obtained by this method may be accounted for by the fact that the ray was directed through the angle and ramus of the jaw instead of through the soft tissues behind the jaw.

*Diaphragmatic Hernia of Fundus of Stomach Through the Esophageal Hiatus.* L. B. MORRISON, M. D., J. A. M. A., 84:161-163, Jan. 17, 1925.

IN roentgenographing the fundus of the stomach in a series of 3,500 cases, the author has observed 42 cases of congenital hernia of a portion of the fundus of the stomach through the esophageal hiatus. In this series, the roentgenographic examination followed a definite procedure. Observation is first made with the patient in the upright position, thereby obtaining the anteroposterior and oblique views, and noting the position of the diaphragm and its movements, the cardiac shadows and the posterior mediastinum. In only four of these cases was a gas bubble observed above the diaphragm, which may be best seen by looking obliquely through the posterior mediastinum.

A barium meal is then given. Normally a slight spinner-like effect appears at the cardia with the respiratory movements and the barium meal, on rapid ingestion, may be seen in the lower esophagus in a column from two to three inches in height. In practically all of the hernia cases, this column of fluid remained from four to five inches in height, the esophagus being slightly enlarged. After the ingestion of the barium meal, an attempt to fill the hernia by pressure is often unsuccessful. The hernia frequently mechanically obstructs the esophageal emptying.

Examination of the patient on the horizontal table, reveals a patent cardio-esophageal opening. This is unusual in normal stomach, the condition being more frequently seen in cases with organic pyloric obstruction with gastric dilatation as the result of malignancy or ulcer, or senile atonicity, or malignancy of the fundus or of the lower end of the esophagus. For this reason these patients often complain of regurgitation on lying down and an inability to sleep on their backs or left side.

As a rule, the hernia may be filled by rotating the patient into the oblique position and having the patient take full inspiration; but depending upon the position of the diaphragm and stomach, the right supine, oblique or prone positions give the best results. In one of these positions the fundus seems to lift up through the diaphragm somewhat to the left posteriorly, and, as it comes through the hiatus, it partially surrounds the esophagus, filling first the lower portion of the posterior mediastinum, then pushing out behind the heart shadow. When the fundus is herniated and filled, it causes pressure and prevents the passage of food down the esophagus. The discomfort from the hernia depends not on its size but on its being adherent or on its blocking of the esophagus.

*A Retrospect.* Editorial, M. J. of Australia, 1, 12th year: 89-93, January 24, 1925.

THE use of the roentgen ray as an aid to the diagnosis is exemplified by the fact that it has been universally acknowledged to the extent that fully 90 per cent of the patients entering the large general hospitals pass through the roentgenological departments. This has been particularly true in the gastrointestinal cases in which the Australian workers have reported correct diagnosis in 95 per cent of the examinations.

In those cases radiated for gall bladder pathology, 30 per cent of the cholelithiasis have been demonstrated and an additional 10 per cent of thickened gall bladders have been recognized. Australian radiologists have recommended the adoption of the oblique position with the patient rotated to the right and the tube placed in front of the patient. In this manner, the shadow of gall stones and affected gall bladder is thrown away from the kidney shadow.

In chest radiography, rapid exposures at from 120 to 180 cm. from the tube reveal extremely fine detail of the lungs. Furthermore, silicosis cannot be demonstrated by any other means than by the use of the roentgen rays.

In connection with treatment much has been done with the short waves. Deep x ray therapy is a valuable addition to the therapeutic measures in malignant and other diseases. Many Australian workers are devoting much of their research activities to this work. In fact a movement is on foot for the establishment in the larger cities of Australia of central cancer institutes at which modern high voltage x ray apparatus are to be installed.

to radiation. To a much greater susceptibility do pathological cells react to the radiations. For this reason, the basis of the successful radiation treatment of tumors depends on the accuracy of the diagnosis.

In the treatment of chronic metritis and fibromyomata with radiation, certain conditions are necessary: The patient should be over forty years of age; there should be no evidences of degeneration, no signs of either chronic or acute inflammation; tumors that extend as high as the umbilicus are more successfully treated surgically; pregnancy contra-indicates radiation. "After eliminating the groups of cases indicated above as unsuitable for radiation, there remain about 30 per cent of all cases of fibromyomata that may be successfully treated by radiation. Relief of symptoms may be anticipated in 99 per cent of properly selected cases and the percentage of complete cures averages about 87 per cent." The choice between radium and x rays depends on three factors: (1), In large tumors, x rays in comparatively large doses is to be preferred for there is a more rapid regression of the mass; (2), economically, x ray therapy is more reasonable for hospitalization is not required; (3), in skilled hands, the danger from x ray therapy is negligible.

In the treatment of carcinoma of the uterus, the author considers it highly improbable that radiologists can improve upon the results obtained by surgeons. From the standpoint of physics, however, he states that it is as easy to administer a dose of radiation to the fundus as to the cervix.

In the consideration of the results of the treatment of carcinoma of the cervix, the favorable results of either the radium therapy or operation depends upon the extent of the involvement, for "although a therapeutic dose of radium radiation can be administered to areas beyond the reach of the knife or cautery, yet there remains a large group of cases in which the involvement is beyond the reach of either. Moreover, in any given case it is impossible to determine the extent of the carcinomatous involvement. These limitations of surgery and radium demand the addition of the recently developed deep x ray therapy in the treatment of carcinomata of the cervix. .... We believe that the proper treatment of malignant disease must include surgery, radium and x ray in such a combination as is indicated by the individual case. In the treatment of carcinoma of the cervix, at present,

we believe that the combination of radium and x ray radiation is the therapeutic method of choice.... Our own experience thus far leads us to believe that the patients treated by the combination of deep x ray and radium therapy have been benefited more than those treated by surgery alone or by surgery and radium."

There are certain contra-indications to radiation in the cases of carcinoma of the cervix that are pointed out by the writer: (1), the presence of tubal infections; (2), the presence of far advanced disease; (3), a poor general physical condition, though these cases may be made radiable by blood transfusions.

*The Role of Radium in the Treatment of Benign and Malignant Tumors of the Uterus*

THOMAS E. JONES, M. D., J. Iowa State M. S., 15:6-9, January, 1925.

THE question as the method of treatment of benign and malignant tumors of the uterus still remains an open question among the medical profession at large. Observations made by the author from statistics from the Cleveland Clinic may aid in the clarification of this debated subject.

Surgical treatment of cervical carcinomata has resulted in the cure of 9 per cent of those patients consulting the surgeon. If radium is to be considered successful a cure must be obtained in more than nine cases out of a hundred treated. At first only the inoperable cases were treated at the Cleveland Clinic by the radium therapy, but the results were so encouraging that at the present time all cases of carcinoma of the cervix presented at the Cleveland Clinic are being treated exclusively with radium and x ray. Since this combined method of treatment has been in use for only one year there are no available decisive statistics, yet the opinion of the author is that an improvement is obvious.

In the treatment of cancer of the cervix 75 mg. of radium is placed in the cervix screened with  $\frac{1}{2}$  mm. silver and 1 mm. brass. 50 mg. against the cervix and 75 mg. inserted at various points in the cervix, the treatment being continued for periods varying from twelve to sixteen hours. The vagina is packed and in from three to four weeks the patient is treated again by placing 125 mg. screened with 1 mm. of brass against the cervix for from twelve to fifteen hours. In each case a total dosage of from 4000 to 4800 mg. hours is given. No serious complications, such as fistulae or strictures, has occurred. "We are

By this means the treatment would be available to the rich and poor alike, the institutions being publicly controlled.

*Surgery vs X Ray and Radium Therapy in the Treatment of Tumors of the Uterus.* G. W. CRILE, M. D., J. Iowa State M. S., 15:13, January, 1925.

CONSIDERABLE confusion exists in the minds of the members of the medical profession as to the choice of the treatment for malignant and benign uterine tumors. The best way to form a definite conclusion of the applicability of these methods of therapy is a careful study of accurately collected statistics of the results of each method of treatment and a scientific unbiased weighing of the facts presented and their application to the particular patient under observation.

The three following abstracts consist in the presentation of the opinions of those who have studied the existing conditions and observed carefully the statistics presented by their Cleveland Clinic.

As a result of an investigation of the correlation of x ray, radium and surgery in the treatment of tumors of the uterus, the judgment of the author may be summarized as follows:

1. Benign Tumors—(a) During the child bearing period partial, or pan-hysterectomy, or myomectomy are advised.

(b) In association with pregnancy, if the operation cannot be delayed, operation under complete anociation is done. The technique of operation even on the pregnant uterus has been so perfected that the author now removes myomata without the usual element of emotional shock or danger of miscarriage.

(c) At the period of or after the menopause, intramural fibroids of moderate size or fibrosis associated with hemorrhage should be treated by radium or radium plus deep x ray therapy, unless the tumor is submucosal or subperitoneal. This conclusion was previously made by John G. Clark.

2. Borderline Cases—usually occur in women at the period of or after the menopause in whom examination reveals a normal vagina and a normal cervix, no fibroid and but the slight thickening of the uterine wall, the only sign of trouble being a slightly increasing amount of discharge which may or may not be stained by blood. In these cases, the opinion of the author leans towards vaginal hysterectomy, inasmuch as submucous fibro-

mata may be in the stages of development and radiation would in such a case be beneficial to the patient.

3. Cancer of the Fundus—(a) In all operable cases, vaginal hysterectomy is advised.

(b) In inoperable cases, radium alone or in combination with deep x ray therapy offers the best method of palliation.

4. Cancer of the Cervix—"At present, however, because of the favorable results of radium and deep x ray therapy in inoperable cases and the indications of its value in all stages of carcinoma of the cervix, we are not using surgery in any of these cases. We are, however, holding our final judgment in abeyance until a sufficient time shall have elapsed for a definite comparison of the three and five year results of radiation in early cases to be made."

5. General Note—In every case, the patient should be strictly individualized.

*The General Role of X Rays in the Treatment of Benign and Malignant Tumors of the Uterus.* U. V. PORTMANN, M. D., J. Iowa State M. S., 15:3-6, January, 1925.

THE successful clinical application of x rays and radium depends directly upon the thorough understanding of the one in charge of the physical laws governing the action of these two agents. The same physical laws apply to both the x rays and the radium rays.

With the realization of the therapeutic possibilities of these two physical substances, investigation of deep x ray therapy was begun at the Cleveland Clinic. As a result of these investigations, it was decided that a therapeutic dose of radiation could not safely be administered to the most deeply situated malignant tumors by x ray alone. This led to the adoption of the "radiation therapeutic dose" which consisted in the combination of these two similar agents, estimated by superimposing charts which show the rate of absorption of the x rays or equal intensity curves, indicating thereon the involved areas and organs. By this means the exact radiation dose administered could be accurately determined.

The biological effects of the x rays and radium are practically identical. The reaction of the various tissues of the body to the radiation varies not only with the different types of cells but cells of the same morphology may vary in their susceptibility. Among the normal tissues the endothelial cells of the lymphatics and blood vessels are most susceptible

satisfied with the value of radium in inoperable cases of carcinoma of the cervix; we believe that accumulating evidence will give equally positive evidence of its value in early cases, as compared with surgery."

In the treatment of carcinoma of the fundus, the author does not consider radiation therapy advisable because of the good results accomplished by surgery, unless there are contra-indications existing for surgical interference.

In the consideration of the benign tumors of the uterus, it must be remembered that the majority of cases of benign growths in the uterus have been successfully treated surgically. The mortality has been low and the convalescence has been comparatively rapid. Furthermore, the author considers radiation to be definitely contra-indicated under the following conditions: (1), in conditions in which the tumor mass is palpable above the symphysis or if submucous subperitoneal or pedunculated fibroids exist; (2), if the woman under observation is in the childbearing age and pregnancy is not contra-indicated, and (3), usually pelvic pain is considered an obstacle, especially when the pain is due to an old salpingitis or hydrosalpinx.

On the other hand radium may be considered of value in the treatment of the following benign conditions: (1), menorrhagia occurring at any age is considered amenable; (2), fibroid tumors of moderate size without bleeding or other complications are cared for by radiation; (3), fibroid tumors of any size in which surgical treatment is contra-indicated, such as in cardiac disease, pulmonary disease, diabetes, or invalidism, are exposed to radiation therapy.

*The Application of Radiation to Fibroid Tumors of the Uterus.* B. H. NICHOLS, M. D., Ohio State M. J., 21:87-91, February, 1925.

**S**TATISTICAL data is given by the author summarizing the treatment administered to 933 cases of uterine fibroids seen at the Cleveland Clinic. It will also be noted that in 42 per cent of these patients radiation therapy was the logical therapy. The efficiency of radiation therapy in fibromyomata of the uterus is a definitely established fact. Recent standard dosage measurements computed by physicists permit the radiologists to determine the dosage with such accuracy as to obviate any untoward effects.

One argument that has been advanced against this mode of therapy is the statement that by such an administration any accom-

panying pathology is not known and the diagnosis cannot be corroborated; but the author points to the fact that nearly 50 per cent of fibroid tumors occurs in women past 40 years of age and are not complicated in any way by other pathological conditions. A correct diagnosis of fibroids is therefore the immediate prerequisite.

"We are convinced by our own experience and the statistics of many radiation therapists that the vast majority of uncomplicated fibroids may be effectively treated by x ray and radium therapy."

*Value of Radium and Roentgen Radiation in the Treatment of Benign Uterine Hemorrhage.* HARRY E. BUNDY, M. D., Am. J. Roentgenol., 13:162-163, February, 1925.

**T**HE following rules for the treatment of benign bleeding of the genito-urinary tract in women have been adopted by the author:

1. Whenever radium is used intra-uterine, a thorough diagnostic curettage is done and the tissue examined microscopically.
2. Pelvis infections contra-indicate the use of radium.
3. Small doses are used whenever possible to preserve the menstrual cycle.
4. The radium capsule is placed in the fundus, not in the internal os, in order not to destroy the mucous membrane with the resulting atresia followed by pyometra, hydrometra, etc.
5. Uterine bleeding in women at or past the menopause is treated as though malignant.
6. In small fibroids, myomectomy is preferable to hysterectomy. Large fibroids, or those increasing in size rapidly, as well as adenomyomata, are considered to be surgical.
7. Where radium is used in the uterus without cessation of bleeding, we do not treat again until three to six months have elapsed.
8. The dose varies from 300 milligram element hours in young women to 1200 milligram element hours in older women, which is sufficient to stop the bleeding.
9. The only symptom indicating the use of radium or roentgen radiation in or around the uterus in benign conditions is hemorrhage.
10. Radiation over the spleen are used when other measures for the control of hemorrhage have failed.

*Summary of the Clinical Results After Irradiation of Cancer of the Cervix Uteri.* BERN-

ARD F. SCHREINER, M. D., F. A. C. S., Am. J. Roentgenol., 12:367-370, October, 1924.

A summary of the results of 416 cases of cancer of the cervix treated by radiation is given which shows that most of these cases were treated by the application of radium in the cervical canal and the high power roentgen ray from the outside. As a result the so-called operable class demonstrated as good or better results under this method of treatment than has been received under surgical treatment. In farther advanced cases—those considered inoperable—the results have surpassed what one could expect by surgical treatment. Those cases in which all lesions of the cervix were entirely confined to the cervix with no extension into the fornices or vaginal mucous membrane have yielded palliation which lasted from a few months to three years, but resulted in death from the disease.

#### *Osseous Development in Endocrine Disorders.*

WM. ENGELBACH, M. D., & ALPHONSE McMAHON, M. D., Internat. J. Orthodontia, 11: 124-163, February, 1925.

BECAUSE of the striking differences in the osseous development, both local and general, in over 2,000 endocrine observations, the writers were led to suspect that there might be some specific predilection of the various hormones of the special ductless glands in their effect upon the growth and development of the individual types of bones. Studies were undertaken to determine: (1), the normal osseous development in the various ages from one to twenty-five, during the skeletal growth period; (2), the variations from this normal development in the various endocrine disorders, viz., thyroidism, pituitarism, gonadism, etc.; and (3), the possible specific character of the internal secretions of these various glands in their effect upon the individual growth of one set of bones, such as the flat, long, or short.

The studies presented herein apply only to the age of twenty-five, at which time the osseous development is normally completed and the endocrine dyscrasias can present no further alterations. Before the consideration of abnormal osseous development could be discussed, the normal development had to be established. Normals were examined eight to ten days after birth, at six months, one year, eighteen months, two years, and for each year up to the age of twenty-five. A number of each age were examined until enough were found without physical or roentgenological variations from

the normal to establish a standard. In this study, it was noted that there were variations of from two to four years in the roentgenographic studies of Baetjer and Waters, Knox, and Rotch and the dissection made by the anatomists.

After an elaborate discussion of their roentgenographic observations, accompanied by a multitude of comparative normal against abnormal roentgenograms, the following conclusions were presented:

1. The general diagnostic information derived from the roentgenologic comparison of endocrinopathic and normal subjects has led the writers to believe that the radiologic signs offer encouraging prospects of being of more value than the basal metabolism, blood chemistry, and other so-called specific and laboratory determinations.

2. Retardation of development of all bones of the osseous system, not only of the carpals, in uncomplicated hypothyroidism can be demonstrated roentgenographically in all ages up to that of completion of normal skeletal growth. This will be an additional aid to diagnosis in those cases already beyond the age of normal carpal development upon which basis hitherto has depended the roentgen picture of osseous change indicative of hypothyroidism.

3. Hypogonadism and eunuchoidism have consistently shown a definite late fusion of the epiphyseal ends of the long bones. While this has been suspected clinically, we are unacquainted with any definite roentgenologic demonstration of these abnormalities in secondary hypogonadism. The late closure of the epiphyseal ends in the presence of an active hormone from the anterior lobe of the hypophysis explains the overgrowth of the long bones in these subjects.

4. In the anterior lobe pituitary insufficiency in which there is a primary deficiency of the anterior lobe and a secondary deficiency of the generative organs, there has been found uniformly present a late closure of the epiphyseal ends of the long bones, associated with undergrowth of these bones. The reason for the undergrowth of these bones in the presence of the open epiphyseal ends in this disorder is the absence of the hormone from the anterior lobe of the hypophysis.

5. In the pluriglandular syndrome, the development of the osseous system as demonstrated roentgenologically is very difficult to interpret. From the studies of our cases thus far, we are of the impression that the follow-

ing facts obtain: (a), in the thyro-pituitary disorder there is an absence of the carpal and long bone nuclei development over that of the pure hypothyroidism unassociated with pituitary disorder. (b) In pituitary-thyroidism, there is a retardation of the appearance of the osseous nuclei, as well as of the fusion of the epiphyseal ends of the long bones, more marked than that in pure hypothyroidism or in the normal. (c) The markedly heterogeneous pictures presented in the multiglandular syndromes will depend upon the sequence in which the various disorders were superimposed upon each other. For this reason, the combination of the same glandular disorders might present entirely different radiographic pictures of the osseous development at the same age, depending upon the order in which the various glands might have become involved.

6. In the less frequent but more instructive condition of pubertas praecox (suspected pinealism), the most unusual advancement in development of bone nuclei and early fusion of the epiphyseal lines was found. The four cases studied confirmed our earlier belief relative to the effect of gonad hormone upon the osseous growth and development, and were a convincing confirmation of the exactly opposite picture consistently present in the hypogonad.

7. Thymo-lymphatism in the few cases studied apparently presented much the same osseous retardation as mild hypothyroidism. The osseous development in positive cases of enlarged thymus should be more thoroughly studied, with the view of clearing up this much noted point of the relation of thymus function to osseous development.

*Lateral Roentgenography of the Lumbosacral Region.* LEON T. LEWALD, M. D., Am. J. Roentgenol., 12:362-367, October, 1924.

THE technique used at the United States Veterans Bureau, for the lateral roentgenography of the lumbosacral region, at which place the cases presented in this report were examined, is as follows: for an average sized person,  $7\frac{3}{4}$  inch spark gap, 50 ma., 24 inch distance, about two second's exposure with superspeed films and a Bucky diaphragm.

From these observations it is evident that the lumbosacral angle varies considerably in healthy individuals and the angle at birth is always much less than that observed roentgenographically in the average adult.

The diagnosis of lumbosacral dislocation should never be made from an anteroposterior

exposure alone. Lateral exposure may show an inclination of the fifth lumbar combined with a practically horizontal first sacral segment which produces a marked foreshortening in the anteroposterior exposure.

In medico-legal cases, asserts the author, no matter how severe the trauma, one should always guard against the assumption that the trauma necessarily produced a particular variation from the usual anatomical appearance and no case should be decided without the aid of lateral roentgenograms.

*Pneumopericardium.* LEO G. RIGLER, M. D., J. A. M. A., 84:504-506, Feb. 14, 1925.

PNEUMOPERICARDIUM is a rare condition, a careful search of the literature up to this time revealing only 73 cases, most of them complicated by the presence of fluid. The cases are best classified according to their etiology: (1), spontaneous gas production; (2), traumatic perforation of the pericardium; (3), perforation from or into a neighboring organ, and (4), artificial injection of gas. In a report of a case under the observation of the author, in which tuberculous pericarditis with effusion was the condition encountered, air was injected into the pericardium in an attempt to produce an artificial pneumothorax. The therapeutic application of air in this case resulted in an adhesive pericarditis, although the effusion was eradicated.

*Physiotherapy of Some Peripheral Circulatory Diseases.* CARROLL S. THOMSON, M. D., Am. J. Electroth. & Radiol., 43:57-60, February, 1925.

PERIPHERAL circulatory disturbances are more prone to affect the lower extremities in the form of varicose ulcers, the various forms of phlebitis, and præsénile spontaneous gangrene. These conditions can be successfully treated by radiant light and heat, followed by the administration of the static brush discharge. The patient attached to the negative side of the machine and the positive side grounded, form the therapeutic groundwork. The radiant light and heat causes an increase in the blood supply to the deficient area, and the static brush discharge stimulates the entire arterial, venous, and lymphatic circulation. The radiant light and heat is administered by means of a hot cobalt blue 1500 watt lamp, or by the application of the heat rays of the spectrum. In addition, a slow sinusoidal current is used to break up the adhesions

throughout the entire leg, or the static induced current is used when it is necessary to stimulate the lymphatic and blood vessels of the pelvis and thighs without stimulating the circulation of the lower limb. In varicose ulcers, the ultra violet ray is employed and delivered to the ulcer itself.

*Points of Interest in the Diagnosis and Treatment of the More Common Diseases of the Blood.* HAROLD W. JONES, M. D., *Therap. Gaz.*, 48:849-855, December, 1924.

THE treatment of the blood diseases is both palliative and curative. In the consideration of acute myelogenous and lymphatic leukemia, drug administration and blood transfusion have proved of little value, splenectomy has proved useless, while radium and x ray applications may prolong life for a short period of time. In the care of chronic myelogenous and lymphatic leukemia, radium and x ray applied to the spleen have done more to prolong life than any other measure and should be used in each case.

The author presents a table whereby the various blood pictures and tests may be utilized in the differential diagnosis of these blood diseases.

*Generalized Giant Lymph Follicle Hyperplasia of Lymph Nodes and Spleen.* N. E. BRILL, M. D.; GEORGE BAEHR, M. D., & NATHAN ROSENTHAL, M. D., *J. A. M. A.*, 84: 668-670, Feb. 28, 1925.

THE hitherto unrecognized disease entity of splenomegaly and generalized lymphadenopathy, to which attention is called in this article, is characterized by a giant lymph follicle hyperplasia of the lymph nodes, and by a similar pathologic process of the malpighian bodies in the spleen, resulting in an enormous splenomegaly. The blood picture in this condition is normal, and the condition is apparently benign.

Radiotherapy, according to the author, is the only method that produces complete disappearance of the lymph nodes and causes a reduction in the size of the spleen to normal and the patient to health. Arsenic is ineffectual. According to the experiences of the writer, adequate roentgen ray treatment reduces the spleen and lymph nodes in such a manner that enlargement does not recur. Because of the short time that this treatment has been employed, one cannot say as to the curative power of the roentgen ray for this condition but the results so far have been very satisfactory.

*Some Practical Points Regarding Tuberculosis.*

EDWARD S. MCSWEENEY, M. D., *Long Island M. J.*, 19:142-144, April, 1925.

IT is a question in the mind of the author whether or not a physician can diagnose active as distinguished from arrested tuberculosis with the x ray alone. "An x ray will reveal with considerable certainty a tuberculosis lesion which has healed and is no longer a menace to life or health; but it is doubtful if any x ray picture indicates that a person who has a lesion is sick or incapacitated because of the lesion that appears on the plate, or even that the lesion is likely to produce sickness in the future. . . . An x ray shows the pathological condition only, and this must be correlated with the clinical symptoms and the physical examination in order that a diagnosis of active tuberculosis may be made."

*Aids in the Diagnosis of Incipient or Minimal Adult Pulmonary Tuberculosis.* FOSTER MURRAY, M. D., *Long Island M. J.*, 19:128-135, April, 1925.

THE roentgen ray has been one of the greatest contributions made by science to aid in the diagnosis of intrathoracic conditions. Its value depends directly upon the training of the technician and upon the experience of the interpreter.

The radiogram reveals two essentially distinct types of pulmonary lesions: (1), parenchymatus or an involvement of the alveolar cells; (2), peribronchial or an involvement of the lymphatic systems. An increase in the density is perceptible as tubercle formation occurs in the alveolar tissue, and is shown on the roentgenogram by cloudy flocculent spots of hazy borders and irregular outline which run together in a cotton-like mass with the coalescence of neighboring tubercles. Such changes often precede any appearance of symptoms and is of distinct diagnostic value in the detection of an early involvement. In the peribronchial type of tuberculosis, wherein the lymphatic system is involved, the radiogram reveals linearly disposed densities extending in a minute chain of nodes from the hilus out toward the periphery of the lung.

The finding of a definitely enlarged mediastinal shadow, writes the author, of irregular outline, especially if associated with sharply outlined isolated densities about the root of the lung, are of sufficiently grave import when taken with a history suggestive of clinical

tuberculosis to warrant a strong presumption of intensive infection.

The fluoroscope presents certain advantages over the x ray film. It presents an opportunity for the study of thoracic movements and any limitations thereof, and for the study of the mediastinum in a lateral and diagonal direction.

"The fluoroscope is of aid in diagnosing minimal tuberculosis when the following points are carefully noted: (1), A definite lessened transmission of ray (clouding) in one or both apices, persisting after repeated coughing and forced inspiration and not lighting up during the act. (2), A lessened amplitude of excision during deep inspiration and expiration of one diaphragm as compared with the other. This thing will sometimes be surprisingly definite with ever so slight an apical lesion."

*Differential Diagnosis of Certain Chronic Lung Lesions.* FRANK S. BISSELL, M. D., Am. J. Roentgenol., 13:126-129, February, 1925.

**A**CCURATE roentgenologic diagnosis of lung lesions must be based upon anatomical and pathological knowledge. Abnormal densities are the expression of pathological change.

Both the distribution and the character of tuberculous densities are significant and quite characteristic.

Chronic lung infections due to other organisms have not received much attention from pathologists because they do not directly cause death and are usually unrecognized by clinicians. They are, however, of frequent occurrence and may be observed roentgenologically.

*Heliotherapy in Tuberculosis.* SAMUEL H. WATSON, M. D., F. A. C. P., Southwestern Med., 9:4-9, January, 1925.

**H**ELIOTHERAPY has been little recognized in the United States until after 1913 when Rollier published his book, based upon observations covering a period of over ten years, "Die Heliotherapie der Tuberculose." Since that time interest in this method of therapy has gradually grown until it has become a popular mode of administration in the American medical profession. But heliotherapy is not by any means universally indicated in all cases of tuberculosis. In fact, there are many patients in whom it ought not to be used at all.

Heliotherapy is not a cure-all for the general conditions nor a cure for any type of

tuberculosis, but is, in many cases, a very necessary and valuable adjunct therapeutic measure, especially in the so-called surgical tuberculosis.

Heliotherapy, for the very reason that it is not a cure, must never be used to the exclusion of other valuable recognized measures, such as rest, both mental and physical, nutritious diet, etc.

Heliotherapy, it must be remembered, can do great harm when carelessly administered; for sunlight is a very powerful agent. In the same dosage, heliotherapy affects different patients differently, more than any remedy with which the author is familiar, especially in the beginning of its use. For this reason alone, heliotherapy should not be administered after any fixed rule but should be administered according to the reaction manifested by the patient.

Heliotherapy is of the greatest value, and may be allied with the least chance of doing harm, in pure extra pulmonary tuberculosis, i. e., the so-called pulmonary tuberculosis without a pulmonary lesion. It is a great therapeutic agent in the treatment of extra pulmonary tuberculosis carrying a coincident pulmonary lesion, but in giving it, one must be very much more careful than in the uncomplicated form, especially about the thorax. In the hilus gland type of tuberculosis heliotherapy should be used in all such cases. Heliotherapy is also of some value, in the opinion of the author, in some cases of the productive type of pure pulmonary tuberculosis, but it must be used with the greatest caution. If carelessly used it may transform a favorable, stationary, or healing lesion into a rapidly progressing, fatal one.

Heliotherapy is practically never of value, and is often positively harmful in the exudative type of pure pulmonary tuberculosis as well as all acute forms, and ought, therefore, never be used in these types.

Heliotherapy used in any type of tuberculosis must always allow the patient to feel the same, or better, both during the sun bath and after the sun bath. If it does not—the author expresses this as a word of warning—there is something wrong. Beware!

Aerotherapy, meaning the general air bath without any direct rays of the sun, time may prove to have most or all of the advantages of the heliotherapy treatment in pulmonary tuberculosis with none of its advantages.

*Experiences of the Final Results in Roentgen Treatment of Tuberculous Lymphomata.*

GOSTA RUNSTROM, *Acta Radiol.*, 3:486-493, December, 1924.

AN analysis was made of 145 cases of tuberculous lymphomata between the years 1911 and 1922 which were treated polyclinically by the roentgen therapy at the Seraphimer Hospital, Stockholm, Sweden.

In estimating the results, the author divided these cases into three groups with regard to the condition of the glands at the commencement of the treatment. There were 18 cases of simple glandular hyperplasia, 41 cases of glandular hyperplasia with periadenitis, and 86 cases of broken down glands with the formation of eventual fistulae.

The results obtained may be tabulated as follows: 36 per cent, both subjectively and objectively healed, of which 8 cases belong to the simple glandular hyperplastic type, 13 cases to the hyperplasia with periadenitis type, and 32 cases to the broken down and fistulous type; 53 per cent have some persistent, indolent and glandular remains; 10 per cent have had recurrence and have become healed after repeated treatment; only one case remains unhealed—this case belonging to the broken down glandular and fistulous type. The duration of the healing after the last treatment has been two to three years in 40 per cent, three to five years in 30 per cent, and five to ten years in 30 per cent of the cases.

Skin changes have occurred in 25 cases (17 per cent), out of the entire number of cases treated, namely: in 18 cases dry, thin skin resulted, while in 7 cases atrophy with telangiectasis was the final outcome. Neither necrosis, ulcerations, nor organic lesions have been observed. Skin changes have been most common in the cases with the fistulae.

The contributory causes to the skin changes may be enumerated as follows: too large doses, exposures repeated frequently during a long period (also in the event of small doses), renewed treatment of recurrences within previously treated areas, and skin irritation owing to persistent secretion from fistulae.

On the basis of the experience gained, the author advises a highly individualized technique: from four to six series of single doses of from  $1/5$  to  $1/3$  H. E. D., spark gap 39 cm., skin focus distance 30 cm., filter 4 mm. of Al. or 0.5 mm. of Cu. or Zn., are used, depending on the extension and condition of the glands.

Lesions of the skin may be avoided by limiting the doses and the time of treatment.

*Roentgen and Light Treatment of Tuberculous Glands.* AXEL REYN, *Acta Radiol.*, 3:455-485, December, 1924.

THE author reports that 553 cases of tuberculous glands have been treated at the Finsen Institute by means of x rays and ultraviolet light between the years 1910 and 1921.

The results tend to indicate that the carbon arc light is much superior to the mercury vapor light. On the other hand the ultraviolet light has been reported to have produced an almost perfect result—98 per cent cure, while the roentgen ray gave only 40 per cent cure.

However, there are other disadvantages to the application of the x ray. X ray may have a deleterious effect on the skin, producing atrophy or telangiectasis of the skin when applied in the doses commonly recommended. In using stronger doses, roentgen ulcers are produced which are healed with great difficulty.

On the other hand, the ultraviolet light has a distinctly beneficial effect upon the body as a whole, without any of the deleterious manifestations. The patients become well and healthy under the treatment and rapidly gain in weight.

The writer emphasizes the modern treatment of tuberculous glands as a combination of the ultraviolet light therapy together with the roentgen ray radiation, the latter in such small doses that all risk of causing harm to patients is excluded.

In the opinion of the author, seaside hospitals for the treatment of tuberculosis is superior to sanatoriums in other locations, for there the air is fresh and crisp and the sun is readily utilized. During the summer months, he suggests that the patients should reside in these seaside sanatoriums to get their sea and sun baths, while in the winter artificial light baths by means of the carbon arc lamp should be given. Children suffering from tuberculous glands should be sent to the seaside sanatoriums, which in turn should be fitted up with these artificial light baths.

*Purpura Hemorrhagica (Thrombopenic Purpura), Leukemia and Erythemia.* GEORGE R. MINOT, M. D., *Boston M. & S. J.*, 192:14-16, January, 1925.

ROENTGEN ray and radium irradiation is the best treatment that can be administered for chronic leukemia. It is a recognized

fact that patients who are in an apparently distressing condition can oftentimes be returned to a useful and functionally efficient existence for varying periods of time by the administration of this method of therapy. Numerous case reports can be given from reliable sources to substantiate this contention. Results obtained from roentgen radiation today differs considerably from the results obtained a few years ago, so it is reasonable to anticipate that those under treatment will, on the average, do better than those formerly treated. Furthermore, enough time has elapsed since the inauguration of this therapy for leukemia so that the end results of many series of cases have been authentically tabulated.

As a rule, cases of chronic myelogenous leukemia live on an average a little over three years, while those of chronic lymphatic leukemia live a somewhat shorter time. In spite of this fact, under radiation treatment these patients show symptomatic improvement in 95 per cent of chronic myelogenous leukemias and at least 50 per cent of these patients become temporarily symptomatically well. The duration of efficient life is on the average 30 per cent longer in irradiated than in nonirradiated cases. It is stated by the author that the actual duration of the efficient life after irradiation is proportional to the duration of the disease. However, as leukemia progresses the patient's comfort decreases and radiation becomes less and less effective.

Treatment of the leukemia should be guided and the prognosis formulated from correlated information obtained from the patient's history, the physical examination, together with the blood findings and the basal metabolism tests. Sternberg and Goenczy (Zeit. f. klin. Med., 100:257, 1924), believe that the reaction of the cells of the blood to diathermy may prove serviceable in the determination of the therapeutic indications for radiation therapy.

In conditions of polycythemia, roentgen ray radiation offers one effective way of controlling the disease. In all probability the unfavorable results reported in the past may be rightfully attributed to the improper use of the therapy at hand. The more recent reports, particularly those given by the author from the works of Head, Mosenthal, Pendergrass, Rydgaard, Schultze, Steiger and Stolkind, indicate that if large doses of short wave length therapy are given adequately, particularly over the long bones, that benefit is the rule. In their observation, treatment of the spleen alone has

little effect upon the polycythemia. In a parallel observation, the action of drugs, as benzol or phenylhydrazin, that enhances blood destruction, have proved unreliable without the combined action of the roentgen ray. Due to the spontaneous remissions and relapses that normally occur in the disease, so that in periods of weeks or months a considerable change in the actual level of the red cells and hemoglobin may occur, the treatment of this disease must be controlled and guided by frequent blood examinations, to prevent too serious marrow depression and blood destruction following the radiation of the long bones.

*Precancerous Eruptions of the Skin.* FRANK CROZER KNOWLES, M. D., Illinois M. J., 47: 21-25, January, 1925.

ONE of the factors that used to be prominent in the causation of lupus carcinoma, besides chronic ulceration and old age, is radiation burns—both from roentgen and light rays. These roentgen ray cancers, as they were called, were observed much more frequently in the early days of roentgen ray therapy, before the need of protection for the operator and patient was fully realized. The backs of the hands were most frequently involved, due to the actinic rays from the roentgen tube. Again cicatrix carcinoma, another form of epithelioma, have arisen from cicatrizing dermatosis, as well as from extensive scars and atrophies from new growths, trauma and the roentgen ray radiation.

Roentgen ray, however, as a causative factor for precancerous eruptions of the skin, has been eliminated by the rapid advance of roentgentherapeutics, the realization of its dangers and the adequate protection of the operator and patient from these dangers.

*Lupus Erythematosus and Its Treatment by Radium.* HUGH MACKAY, M. D., C. M., Reprint, Canadian M. A. J., January, 1925.

LUPUS erythematosus is a toxic erythema occurring in two forms—the chronic or localized variety, which is usually symmetrically distributed, discoidal in outline and manifests a predilection for the face; and the acute or diffuse type, which is commonly widespread, occasionally generalized, and not infrequently terminates fatally.

In the treatment of this disease a suspiciously long list of remedies is recommended by various authors. In the writer's experience, radium applied topically has proved of great

service. A ten milligram plaque covered with oil silk or rubber dam is applied for fifteen or thirty minutes to the circumscribed patches. The diseased area is blocked off into squares; care must be exercised that the plaque is accurately placed and held firmly in position. Sometimes the radium is kept moving very slowly over the surface, allowing approximately fifteen to thirty minute exposures for each square represented by the size of the plaque. This method tends to obviate the danger of the "postage stamp" effect often noticed when the plaque is strapped to the skin. The entire field must be covered before a treatment is complete. Special attention should be paid to the margin and the region immediately beyond it, since the morbid process is most active in these situations. It is axiomatic that the minimum radiation consistent with resolution in the affected part should be delivered to the tissues.

An interval of about two months is allowed between treatments. Time must be given to enable the tissues to recover from the radiological shock. A considerable interval between treatments also lessens the danger of telangiectasia, atrophy and pigmentary anomalies. After the expiration of this time, if resolution has not taken place, further treatment following the technique is recommended by the author. Improvement was noticed in practically every case in which this treatment was followed out; some patients remained well, but the majority showed recurrences more or less marked which required further applications. Radium applied topically is not the ideal agency, according to the author, but is only an aid to the treatment. The symmetrical distribution of the lesions suggests a haematogenously borne infection. The skin manifestations are probably only symptoms and behind these cutaneous expressions a systemic cause is really at work. Demonstrable foci of infection wherever open to attack should be thoroughly eradicated.

*Some Further Investigations Into the Optical Characters of the Lupus Nodules and the Bearing of these Characters on the Finsen Treatment.* H. HAXTHAUSEN, M. D., *Acta Radiol.*, 3:494-501, December, 1924.

IN a preceding paper, the author demonstrated the greater transparency of the lupus tissue as compared with that of the normal skin, which had been investigated

quantitatively with special regard to the chemically active rays.

With a thickness of tissue neighboring 2 mm., it was found that the rays playing the greatest role in the Finsen treatment penetrated the lupus tissue in quantities from double to six times as great as the quantity that passed through normal skin of the same thickness.

This circumstance furnishes a natural explanation of the particular efficacy of local, phototherapeutic treatment in the case of lupus vulgaris; the action, from mere optical causes, becomes markedly elective toward the diseased tissue, where the operation of the light becomes both stronger and more deeply penetrating.

## BOOK REVIEW

*Das Pneumoperitoneum in Der Gynakologie.* By Dr. Med. et Phil. Hermann Wintz, O. Professor, Direktor der Universitäts-Frauenklinik Erlangen, and Dr. Rudolf Dryoff, I. Assistent an der Universitäts-Frauenklinik Erlangen. Cloth. Price \$5.40. Pp. 163, with 5 drawings and 51 photographic illustrations. Leipzig: Verlag Von Georg Thieme, 1924.

THIS volume is a treatise on the use of pneumoperitoneum in gynecology and is divided into two parts—the first textual in character, the second made up almost entirely of illustrations with explanatory legends thereto.

The first or textual portion is in turn divided into twelve main subdivisions under the following headings:

1. Einleitung.
2. Die Beschreibung unserer Technik.
3. Die Unterschiede der geschilderten Technik gegenüber den verschiedenen in der Literatur dargelegten.
4. Allgemeine Indikationen.
5. Die Gegenindikationen.
6. Klinische Erfahrungen.
7. Die Gefahren des Pneumoperitoneums.
8. Die physikalischen Grundlagen.
9. Die Deutung der Röntgenaufnahmen des Pneumoperitoneums.
10. Die stereoskopische Aufnahme; ihre Bedeutung für die gynakologische Diagnose.
11. Der Wert des Pneumoperitoneums.
12. Die Grenzen der Leistungsfähigkeit der Methode.
13. Literaturverzeichnis.
14. Atlasteil mit Bildertext.

#### ABSTRACTS AND REVIEWS

The second portion of the book is devoted to radiographs and their legends made of subjects who later came to laparotomy after the examination so that the interpretations of the x ray films have been definitely proven.

It is the opinion of the authors that pneumoperitoneum is a very great help in the diagnosis of gynecological conditions and they recommend that stereoscopic plates be made in each case.

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#### BOOKS RECEIVED

This column is devoted to acknowledgement of the books received. Such acknowledgement must be regarded by the sender as sufficient recognition of the courtesy until time and space will permit selections to be made for review.

1st Book **The Electro-Chemical Factor in Neurology.** A Research in Electro-Biology. By Ernest H. Pasque, Vice-President Atomic Research Association, Pp. 249 with 26 illustrations, and 2nd Book, **New Concepts of Physics.** The New Atomic Science. By Calvin Samuel Page, author of *Science of Physical Phenomena*, *The New Physical Philosophy*, *Ræ the Life Atom*, Pp. 339 with 4 illustrations. Cloth. Detroit, The Atomic Research Association, 1925.

**International Clinics.** Vol. 1, Thirty-fifth Series. A quarterly of illustrated lectures and especially prepared original papers of topics of interest to students and practitioners. Contributed by leading members of the medical profession throughout the world. Edited by Henry W. Cattell, A. M., M. D. Cloth. Price \$2.50. Pp. 301, with 53 illustrations. Philadelphia, J. B. Lippincott Company, 1924.

**Physiotherapeutic Lectures.** A group of lectures, clinics and discussions on electro-physiotherapy by some of the most able men in this field of medicine, which constituted the program of the Third Annual Physiotherapeutic Convention, held at Logan Square Masonic Temple, Chicago, under the auspices of H. G. Fisher & Company. Cloth. Pp. 740 with 84 illustrations. Chicago, H. G. Fisher & Co., 1924.

**X Rays and X Ray Apparatus.** An elementary course designed by one experienced in the instruction of medical students on the physical principles utilized in the field of radiology. By John K. Robertson, Associate Professor of Physics, Queen's University, Kingston, Canada. Cloth. Pp. 228 with 112 illustrations. New York, The Macmillan Company, 1924.

